

JOURNAL of the American Veterinary Medical Association

FORMERLY

AMERICAN VETERINARY REVIEW

(Original Official Organ U. S. Vet. Med. Assn.)

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JOURNAL
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American Veterinary Medical Association

FORMERLY AMERICAN VETERINARY REVIEW

(Original Official Organ U. S. Vet. Med. Ass'n.)

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SOCIAL FEATURES AT MONTREAL

The portion of the Montreal program taken up with the social features of the meeting was unusually great, so much so that there were frequent expressions of opinion to the effect that we are over-crowding our programs with social diversions, at the expense of business and scientific sessions. Another thought, along the same line, and given expression by quite a number, is that our meetings are too long. Practitioners especially can ill afford to leave their practices for five days, plus the time consumed in travelling to and from the meeting. This is something that demands serious consideration.

The morning of the first day (Monday) was taken up with the customary opening exercises, with practically no business transacted. The minutes of the session were published in the October issue, together with the presidential address. Monday evening was given over to the President's reception, a very enjoyable affair. President and Mrs. Welch were assisted in the receiving line by Sir Arnold and Lady Theiler, Dr. and Mrs. M. C. Baker, of Montreal, Dr. and Mrs. L. Frood, of London, England, and Secretary and Mrs. Hoskins. After the hand-shaking was over Mrs. Welch and a corps of able assistants kept the wall-flowers from getting rooted in any one spot by keeping everybody on the move. Delightful music enabled many to synchronize their movements until well on towards midnight.

Tuesday morning was devoted to sectional meetings and the afternoon to very serious business, including the election of officers. The evening was given over to meetings of the various alumni associations. Those holding such meetings were the alumni of the Ontario Veterinary College, McGill University and Montreal Veterinary College, American Veterinary College, Ohio State University, Cornell University and University of Pennsylvania. An account of these meetings will be published elsewhere. It can truthfully be said that there are no more enjoyable features of our meetings than these college get-togethers. They constitute a fixture of our meetings.

This year the alumni meetings convened early and were of shorter duration than usual, to enable the members to attend the illustrated lecture by Sir Arnold Theiler on veterinary conditions in South Africa. This proved to be one of the most

interesting presentations ever heard by those whose privilege it was to be present.

Wednesday was devoted to sectional meetings, including the clinic. The evening and a fair part of Thursday morning were given over to the banquet, the first we have had since the meeting in Columbus, in 1920. To those of us who have grown accustomed to the stereotyped procedure of similar festivities in the States, it was somewhat difficult to grasp the scheme of the Montreal method. Once started, however, the affair gathered such momentum that along about midnight many began to wonder whether Toastmaster White would be able to bring the thing to a stop without serious casualties. Just about the time that one member got upon his feet to move that the balance of the speeches be read by title and published in the JOURNAL, the Editor, sensing the situation, demonstrated that he possessed wonderful terminal facilities by bringing the speech-making to an abrupt close.

To those who may wonder what the banquet was all about, and why it was necessary to consume parts of two days with it, kindly be advised that there were about a dozen persons scheduled to respond to toasts, that each toast had to be announced by the toastmaster, who introduced someone to propose each toast. After the toast had been proposed in proper fashion, one or more individuals were called upon to respond to each toast proposed. Furthermore, it was not sufficient to deliver these toasts in one language, but many were given in two, French and English, and, according to Toastmaster White, both languages were frequently spoken at the same time. The reader is left to place his own interpretation upon this phenomenon. The only other point that we will mention here is that President Welch moved Columbus from Ohio over the line into Indiana during the course of the evening.

Thursday morning a general session was held, and at 1:00 o'clock we entrained for MacDonald College. Here we had a splendid opportunity to stretch our legs perambulating over the spacious campus and rambling through the seemingly endless assortment of buildings and barns, the latter quite conspicuous on account of their vacuity at the time of our visit. Thence we wended our devious way down to the wharf to await the boat that was to take us back to Montreal. Ma Baker, in true motherly fashion, saw to it that none dropped by the wayside, incidentally enjoying several ice cream cones en route. As we

paraded down the main street of Sainte Anne one of the villagers remarked that our party was the largest ever seen in the town.

The ride down the St. Lawrence River, back to Montreal, afforded many their first opportunity to take a real rest. The boat was crowded and there was not much room to move around, so the majority remained seated—until we reached the Lachine Rapids. For those who had never made the trip before, the ride through the rapids proved to be a very thrilling experience, and they breathed many a sigh of relief when the rapids were behind them. It is reported that during the afternoon the Blue Owls held a very successful meeting, presided over (of course) by Grand Chancellor Blattenburg. It is further reported that a French section was added to the Order.

Thursday evening the aquatic features were continued in the form of a moonlight boat-ride on the river. This was much enjoyed by those who stuck to the ship, but quite a few were so fatigued by the day's outing that they were only too glad of an opportunity to get back to the hotel and go to bed early.

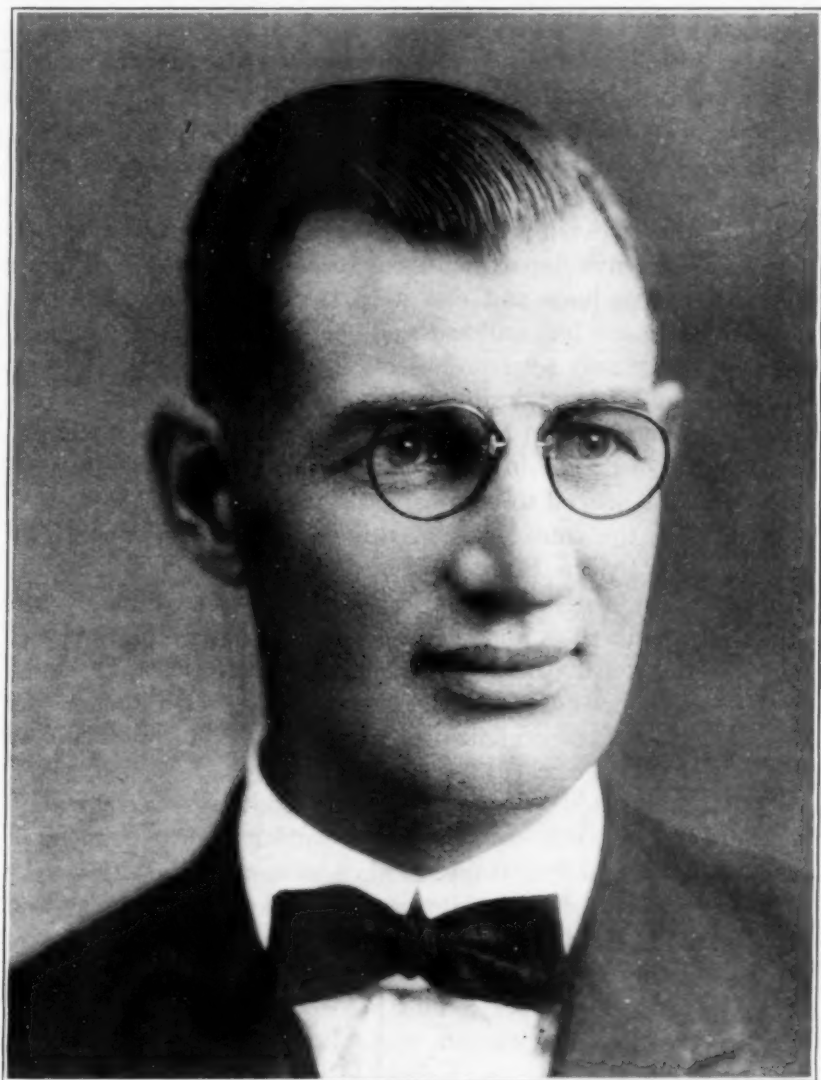
Friday's program provided for sectional meetings in the morning and the wind-up of the business sessions in the afternoon. By the time that President Welch was ready to turn the affairs of the Association over to his successor, Dr Stange, the audience had dwindled down to a scant score. And thus ended one of the most enjoyable meetings ever held.

OUR NEW PRESIDENT

Dr. Charles H. Stange comes quite naturally to the presidency of the American Veterinary Medical Association. He has been a member of the Association since his graduation in 1907 and has always taken a very active interest in the administration of its affairs.

He was born in Cedar County, Iowa, May 21, 1880, was raised as a farm boy of that period and attended the public school of his community. He entered the Veterinary Division of Iowa State College, Ames, Iowa, in 1903 and graduated with first honors in the entire college in 1907. Later he pursued post-graduate work in pathology at the University of Chicago.

His first work was with the Bureau of Animal Industry in connection with scabies eradication in New Mexico. He was soon brought back to Ames, however, to start his teaching career in which he has been engaged continuously since that



CHARLES H. STANGE

President of the American Veterinary Medical Association

1923—1924

time. As a teacher he gained an unusual reputation for clear thinking, careful analysis and ready presentation. He was known as a man who knew his subject, a man of strong convictions and one who possessed a readiness to stand by them. The high quality of his work and the promise for the future were quickly recognized by the College authorities and in 1909 he was made Dean of the Veterinary Division to succeed Dr. J. H. McNeil who had resigned to accept a position at Ohio State University.

Under the leadership of Dean Stange the Division was soon organized into five departments for teaching and research along their respective lines and one department for research solely. Each department has its head and corps of assistants and each teaches only closely related subjects.

The second big task following organization was to secure funds for and plan and build a complete new group of buildings for the work of the Division. The group is unique in its arrangement and has proved to be most satisfactory.

Soon after the completion of this second task, Dean Stange was required by the State Legislature to build a plant for the production and distribution of anti-hog cholera serum and virus and to draw up rules and regulations for the manufacture, sale and distribution of these products throughout the state. The success and efficiency of this organization is well indicated by the effect which the organization had in controlling hog cholera within the State since 1913.

Dr. Stange has won international recognition as a scholar, a teacher, an organizer and a research worker. He is a member of Sigma Xi and Phi Kappa Phi, honorary fraternities, is a prominent member of the Shrine, of the Acacia fraternity and the Rotary Club of Ames. He was a member of the Executive Board of the A. V. M. A. for four years, is a member of the United States Live Stock Sanitary Association and chairman of its committee on hog cholera control. He is also chairman of the Association of State and National Research Workers in Animal Diseases. This Association is composed of two men from each State Experiment Station and two from each division of the Bureau of Animal Industry doing research work in animal diseases.

Dr. Stange has been an active member of the A. V. M. A. since 1907, and besides his four years of service on the Executive Board, he has given much of his time and energy in serving on

several of the important standing committees of the Association. He has always been an advocate of higher educational requirements, of better research work, of better organization for disease control and for better cooperation with the live stock interests. His strong personality, his keen foresight, and his wide acquaintance with veterinarians and with live stock interests, newspaper men and men in control of State and National affairs make him well fitted to pilot the A. V. M. A. through a successful year.

STUDENT ENROLLMENT FOR 1923-4

Figures so far available indicate a slight falling off in the number of students enrolled in veterinary colleges this year. Only four institutions show an increase over last year's figures: Iowa, Texas, Pennsylvania and Washington. Cornell just held her own. The others show fewer students enrolled this year than last.

In the twelve colleges furnishing information, there are 591 students enrolled. It is interesting to observe how evenly these are distributed throughout the four classes. There are 149 freshmen, 152 sophomores, 132 juniors and 153 seniors. Five special students are included in the total. This evening-up of the classes might tend to indicate that our veterinary student population had reached its own level, in answer to the laws of supply and demand. It would appear from our observations, however, that there is a prospective shortage of veterinarians in the not-far-distant future, at the present rate of going.

The following table shows the distribution of students by classes in the various institutions.

	Fresh.	Soph.	Jun.	Sen.	Spec.	Total	1922-3	Change
Alabama P. I.	7	15	12	12	2	48	64	-16
Colorado Ag. Coll.	29	25	10	19	.	83	83	0
Cornell Univ.	2	8	3	9	.	22	25	-3
Georgia St. Coll.	0	11	7	10	.	28	62	-34
Iowa State Coll.	32	24	18	16	.	90	80	+10
Kansas St. Ag. Coll.	12	11	13	18	.	54	65	-11
Michigan Ag. Coll.	5	10	11	9	1	36	39	-3
Montreal, Univ. de
Ohio State Univ.	13	12	24	20	.	69	79	-10
Ontario Vet. Coll.	16	14	15	27	.	72	82	-10
Penn., Univ. of	14	10	10	5	2	41	38	+3
Texas A. & M. Coll.	11	4	5	2	.	22	13	+9
Washington St. Coll.	8	8	4	6	.	26	19	+7
	149	152	132	153	5	591	649	-58

The following table gives some comparative figures on the past five years, to show how student registration has been falling off.

	Students
1919-20 (does not include Indiana or Montreal).....	800
1920-21 (does not include Indiana or Montreal).....	708
1921-22 (does not include Indiana or Montreal).....	641
1922-23 (does not include Alabama or Montreal).....	649
1923-24 (does not include Alabama or Montreal).....	591

MORE NEW NAMES

In the February JOURNAL appeared an editorial entitled "New Names for Old Friends." This dealt with the revised nomenclature for bacteria, based upon the final report of the Committee of the Society of American Bacteriologists on Characterization and Classification of Bacterial Types. Recently there has been published a book, "Bergey's Manual of Determinative Bacteriology," in which the new classification is used, with the new names given various organisms.

Just when we were getting fairly familiar with some of these new cognomens we find ourselves obliged to start all over again, if we are to adopt the very latest appellations given some of our old friends. For instance, we have been struggling to decide what to call the Bang organism, *Bacillus abortus*, *Bacterium abortus*, *Bacterium abortum* or even *Brucella aborta*, when we note that this much-discussed organism now operates under the name *Alcaligenes abortus* and keeps company with *Alcaligenes bronchisepticus*, of canine distemper fame, and *Alcaligenes melitensis*, the Malta fever organism, erstwhile *Micrococcus melitensis*, and for a short time relegated to the newer genus *Brucella*, now apparently defunct.

Our old friend the hog cholera bacillus, so long known as *Bacillus suispestifer* is now *Salmonella suispestifer* and in this very important group we now find all of the colon-typhoid intermediates, with such important representatives as the paratyphoids, *Salmonella enteritidis*, *Salmonella typhi-murium* and others. It is pleasing to record this recognition of the pioneer work of Dr. D. E. Salmon, the first chief of our federal Bureau of Animal Industry, in connection with these organisms.

Some of the organisms causing disease in the human now go under new names. The diphtheria bacillus is now addressed with great dignity as *Corynebacterium diphtheriae*, while the cause

of typhoid fever is now *Eberthella typhi*. The loathsome gonococcus now passes as *Neisseria gonorrhea*, while tetanus is now caused by *Clostridium tetani*. And thus are our troubles multiplied.

FINE PROGRAM FOR SOUTHEASTERN

Secretary Handley has secured a number of very prominent veterinarians to contribute to the program of the Greensboro, N. C., meeting of the Southeastern States Veterinary Medical Association, on November 12-13, 1923. Among these may be mentioned: Dr. C. H. Stange, President of the American Veterinary Medical Association; Dr. John R. Mohler, Chief of the Bureau of Animal Industry; Dr. Cassius Way, Chairman of the Executive Board of the A. V. M. A.; Dr. T. E. Munce, State Veterinarian of Pennsylvania; Dr. W. J. Lentz, Director of the Small Animal Clinic, University of Pennsylvania; Dr. C. A. Cary, State Veterinarian of Alabama; Dr. W. K. Lewis, State Veterinarian of South Carolina and Dr. Wm. M. Moore, State Veterinarian of North Carolina. Prominent practitioners on the program include Drs. J. T. Dixon, of Rock Hill, S. C., F. W. Morgan, of Chattanooga, Tenn., J. G. Phelps, of Montgomery, Ala., F. E. Kitchen, of Greenville, S. C., W. D. Staples, of Anniston, Ala., and R. H. Parker, of Gastonia, N. C. Dr. M. Jacob, Treasurer of the A. V. M. A., is President of the Southeastern Association this year.

COMING VETERINARY MEETINGS

- San Joaquin Valley Veterinary Medical Association, Visalia, Calif., Hotel Johnson, Nov. 7, 1923. H. B. Wintingham, Secretary, 1212 Belmont Ave., Fresno, Calif.
- New York City, Veterinary Medical Association of. Academy of Medicine, 17 West 43rd St., New York, N. Y. Nov. 7, 1923. Dr. C. G. Rohrer, Secretary, 40 West 61st St., New York, N. Y.
- Massachusetts Veterinary Association. American House, Boston, Mass. Nov. 28, 1923. Dr. C. H. Playdon, Secretary, Reading, Mass.
- U. S. Live Stock Sanitary Association. Hotel La Salle, Chicago, Ill. Dec. 4-5-6, 1923. Dr. O. E. Dyson, Secretary, 923 Exchange Bldg., Kansas City, Mo.
- Nebraska State Veterinary Medical Association. Grand Island, Nebr. Dec. 11-12, 1923. Dr. F. R. Woodring, Secretary, Lincoln, Nebr.

ON THE SERUM THERAPY OF GLANDERS WITH SPECIAL REFERENCE TO GLANDERS IN MAN¹

By E. A. WATSON,

*Chief Animal Pathologist, Health of Animals Branch
Department of Agriculture, Ottawa, Canada.*

In a study of the antigenic values and immunizing properties of mallein, by complement-fixation test methods, Watson and Heath,¹ have shown that the horse can without difficulty be hyperimmunized with mallein and that an animal so treated can furnish a serum which, in the complement-fixation test, permits of the titration of any sample of mallein and, thereby, gives indication of the widely varying reactivity and antigenic values of malleins of different origin and preparation.

In December, 1922, in discussing with Dr. Gordon Bell, of Winnipeg, a chronic case of glanders in man which was making unfavorable progress in spite of surgical treatment and local applications, I made the suggestion that the administration of the above mentioned anti-mallein serum might be beneficial and that a trial treatment be given. This was readily consented to and was carried out. Meanwhile another case of human glanders developed and the serum was again employed. The results appeared so satisfactory in each case that Dr. Bell, who has had a considerable experience with glanders in man, published a preliminary note on the subject, "The Serum Treatment of Glanders," Jan. 31, 1923.² Subsequently, and in the same locality, a third case of human glanders was diagnosed and came under serum treatment, and similar satisfactory results ensued. The response to serum treatment, as manifested by the almost immediate arrest of the disease and in the rapid healing of the glanderous lesions in each of these three cases was, according to the physicians, 'amazing and of dramatic suddenness.' All the facts and information that I have been able to collect in this connection together with a précis of the animal experiments and laboratory work, I am presenting in this paper in the interests of the medical and veterinary professions.

Acknowledgments. To Dr. Gordon Bell, of Winnipeg, Provincial Government Bacteriologist and Professor of Bacteriology

¹Presented before the sixtieth annual meeting of the American Veterinary Medical Association, Montreal, Canada, August 27-31, 1923.

and Hygiene, University of Manitoba; to Dr. A. Gibson, of the Galloway-Gibson Clinic, Winnipeg; and to Dr. F. W. Jackson, Wawanesa, Manitoba, for their case reports and notes and permission to include them in this paper.

In the animal experiments, preparation of sera and complement-fixation tests, I have had the active co-operation and assistance of Dr. L. M. Heath, Pathologist, Research Station, Hull, P. Q.

THE OUTBREAK OF GLANDERS IN HORSES, TO WHICH THE HUMAN INFECTION IS TRACEABLE

In May, 1922, a veterinarian reported the occurrence of glanders in the vicinity of Treesbank, Manitoba. Immediate investigation and the application of the mallein test to all suspects revealed eighty-five reactors, including eight horses presenting clinical evidence of the disease. Thirty-three premises were involved in the outbreak. One of the affected animals was a light driving mare, which had been shipped from a neighboring province into Manitoba, towards the end of the year 1919 and was subsequently sold and resold a number of times. This mare was used by all her different owners and their families for driving purposes and in going to dances, entertainments, etc. For a long period, over a year, she had been affected with an intermittent nasal discharge; she is rightly considered as the source of infection in this outbreak and the chief spreader of it.

HUMAN GLANDERS

Case No. 1. (Drs. Gibson, Jackson and Gordon Bell). J. T. C., age 26, farmer. Discharging sinuses, right leg, since January, 1922. Admitted to the Galloway-Gibson Clinic, August 18th, 1922, when examination showed five or six discharging sinuses over the surface of the right leg. Several of these were at the upper end of the tibia, several in the neighborhood of the ankle. Examination under anesthesia showed it was possible to pass a probe from the upper right down through the substance of the muscles in front of the leg to the lower sinuses. The condition of glanders was not suspected until patient accidentally mentioned that a number of horses on his farm had been shot for glanders (thirteen of his horses had reacted to the mallein test and three of these, including the driving mare aforementioned, presented clinical evidence of glanders). *B. mallei* was isolated from the pus taken from the patient's leg. General surgical treatment

with iodine and boric fomentations produced slight improvement in condition.

Serum treatment was commenced on December 27, 1922, on which date there were seven discharging sinuses in the region of the right ankle on the anterior and external surfaces. There was a large ulcer, three-quarters of an inch square, just above the internal malleolus. There was another sinus on the anterior surface of the leg at the junction of the upper and middle third. A probe could be passed from this sinus down through the tissues to the ankle. There was a great deal of discharge, some swelling and complete loss of function in the ankle. The condition had been about the same for four months and was so grave that amputation above the knee was seriously considered.

On December 27, 1.5 cc of anti-mallein serum was given; on Dec. 28, 3 cc; on Dec. 29, 3 cc; on Dec. 30, 3 cc. By this time one could note a marked improvement in the leg, the discharge being a great deal less. Owing to a general state of collapse on the part of the patient, serum was discontinued until January 2, when 3 cc was given. On January 6 and on every second day until January 28, 3 cc of serum was given, when treatment was stopped. All discharge had ceased and all sinuses had completely healed. The ulcer on the inside of the foot did not completely heal for about five weeks.

Thus: A condition of chronic glanders had existed for one year. The lesions were extensive; surgical and general treatment had had apparently no appreciable effect. Under serum treatment the lesions healed and the patient was apparently cured in one month. During the early period of serum treatment the patient suffered periodical rises in temperature, nausea and vomiting, and pain in the forehead (a tender spot could be located above and behind the left eye). At the end of the treatment the patient had regained complete use of his leg and was able to go about his work as usual.

About two months later an abscess developed in the frontal sinus of the head. Glanders infection was suspected. Laboratory examinations showed staphylococci, but were negative for *B. mallei*. More serum was given and the area healed. On April 21, patient was acutely ill again, temperature 103° F., pulse 110, headache, and pain in the left elbow. The general symptoms subsided gradually, but elbow remained swollen, painful and immobilized. Towards the end of June patient was sent into the Galloway-Gibson clinic, where elbow was aspirated. *B. mallei*

was again found in the specimens examined. The elbow broke down into discharging sinuses on July 15.

It is to be regretted, says Dr. Jackson, that there was not a sufficient supply of serum on hand at any one time to give the patient a more thorough and intensive course of treatment.

Case No. 2. F. W. Jackson, age 34, the doctor in attendance on case No. 1. He had a scratch on the right forefinger. He came into his patient's house one day with his gloves very wet and turned them inside out and put them on the radiator. A few days later a sore developed on the injured finger, and in the discharge of pus Dr. Gordon Bell obtained *B. mallei* in pure condition.

Dr. Jackson describes his own case as follows:—

Index finger of right hand became infected January 4, 1923. Glanders suspected. Positive report from swab received January 10. Serum started January 10, initial dose 2 cc; 4 cc given Jan. 11, 13, 15, and 17; 3 cc given every third day thereafter for four doses, then discontinued.

At the start of the treatment the whole dorsal surface of the proximal phalanx of the index finger was involved. This had enlarged from an ulcer one-quarter inch square to one nearly three-quarters by one and one-half inches, with a great deal of discharge, in spite of local treatment. After two doses of the serum all discharge had practically ceased. Three days after the starting of the serum-treatment no culture of the *Bacillus mallei* could be procured from the ulcer. Inside of two weeks after the start of serum-treatment the ulcer was healed and up to the present date there has been no recurrence, August 7, 1923.

Case No. 3. (Dr. F. W. Jackson) A. L., age 13, female.

Was taken acutely ill April 27, 1923, with a chill and headache; vomiting followed, temperature 104° F. Seen forty-eight hours after onset of illness. Complained of headache, cough, pain in right ankle joint. Examination revealed slight bronchitis, immobility of right ankle, pain on movement, no swelling. Swelling developed one day later and fluctuation just below and in front of external malleolus. Opened next day and probed. Sent to Brandon for X-ray on May 3, osteo-myelitis suspected. X-ray showed bones normal. On May 4 general anesthetic was given and foot opened up. Glanders immediately suspected on account of the great destruction of tissue. All the skin on the dorsal and external surfaces of the foot was practically one large

slough. All tendons were bare; five large openings were made and tubes inserted. Examination of potato culture by Dr. Pierce reported on as suspicious. Anti-mallein serum was given as follows: 1 cc twice daily for two days then $1\frac{1}{2}$ cc twice daily for four days, when our supply of serum became exhausted. Three days after start of treatment temperature became normal and at this time another swab was sent to Dr. Gordon Bell. (Report negative.)

Four days after start of treatment discharge had practically ceased and foot began to heal nicely. June 7, all ulcers have completely healed and movement is nearly normal in toes and rapidly coming to normal in the ankle joint. August 8, movement in joint normal no ulceration no discharge; apparently complete recovery.

Note:—Although glanders infection was not proved in this case by isolation of *B. mallei* (the pus was not sent for bacteriological examination until after six injections of serum had been given), no doubt was entertained, clinically, of the nature of the disease which Dr. Jackson regards as acute glanders, probably respiratory in origin.

Bacteriological examinations:—Dr. Gordon Bell examined specimens of pus taken from each case and states: "In cases Nos. 1 and 2 the *Bacillus mallei* was isolated and grew on potato in characteristic fashion and was confirmed by Strauss' reaction on guinea pigs. In case No. 3 I did not examine the pus until some time after serum had been used and failed to find the bacillus, but Dr. Pierce, of Brandon, a very competent man, is sure that the case was one of glanders."

Complement fixation test of human sera for glanders:—On July 15, 1923, Dr. Jackson forwarded to me blood samples from cases Nos. 1, 2 and 3. A complement-fixation test was made, two antigens, (A) a suspension of *B. mallei* and (B) a solution of mallein being employed.

With the suspected sera there were included sera from two of the laboratory workers as negative controls, the serum of a known glandered horse and the serum of a horse immunized to mallein and to killed cultures of *B. mallei* as positive controls.

Human serum, case No. 1, gave strong fixation reactions with both antigens, the serum titre being 0.02 (1.0 cc of 1.50 dilution) with antigen A, 0.1 (1.0 cc of 1.10 dilution) with antigen B. All other human sera were negative. It should be noted that at the time the serum was taken a relapse was occurring in case

No. 1, while cases Nos. 2 and 3 appeared to have made a complete recovery. As already stated, the serum used for the treatment of the three cases of human glanders was obtained from a horse immunized against mallein.

ANIMAL EXPERIMENTS

The accompanying table gives the details of immunization and the titer of the animal's serum, as indicated by complement-fixation reactions, the titer being the minimal amount of serum which completely fixes one unit of guinea-pig complement in the presence of an excess of antigen (mallein). The rabbit-antisheep hemolytic system was employed throughout.

It is, of course, well known, in connection with the serum diagnosis of glanders, that a previous mallein test, or a subcutaneous injection of mallein into a normal horse, may give rise to antibodies and cause positive serum reactions in complement-fixation and agglutination tests for a certain period of time. According to Brocq-Rousseu, Forgeot and Urbain,³ the antibodies disappear and the serum returns to normal in forty-five days after an injection of mallein. Mohler and Eichhorn,⁴ in immunization tests with glanders vaccine, state that "demonstration of the presence of immune bodies in the vaccinated horses ceased entirely in two or three months from the last vaccination that one or two subcutaneous injections of mallein will give a complement fixation which may last from one to two months and that the agglutination value of the serum of such animals is also markedly influenced by subcutaneous malleinization, . . . and it seems that a mallein injection has almost the same action on the production of immune bodies in a horse as killed glanders bacilli."

These views are more or less confirmed by our own observations and experiments. In the preliminary stages of sensitization and immunization, after seven subcutaneous injections of mallein and during a subsequent interval of sixty days, the immunity reactions gradually ceased. However, after each restoration of immunity, by further injections and intervals, a serum of a higher titer was obtained and the duration period of immunity lengthened out, as indicated in the accompanying table. It may be added that this anti-mallein serum gave a higher titer when titrated with a suspension of killed glanders bacilli as antigen than with a solution of mallein as antigen. The titer on Feb. 7, 1923, was 0.002, or 500 units per cc, with mallein, and 0.001, or 1000 units per cc, with a bacillary suspension of glanders.

PRECIS OF ANIMAL EXPERIMENTS

PRODUCTION AND TITRATION (COMPLEMENT FIXATION) OF ANTI-MALLEIN HORSE SERUM
HORSE NO. 1—GREY GELDING

Date	Duration, days	Antiserum		Immunization		Remarks
		Titer	Units per cc	Injection No.	Mallein	
				(subcutaneous)		
June 10, 1921				1	2.5 cc	Preliminary experiment to ascertain the presence of specific antibodies in the serum in response to subcutaneous injections of mallein.
June 23, 1921	13			2	5.0 cc	
June 30, 1921	20			3	7.5 cc	
July 7, 1921	27			4	10.0 cc	
July 21, 1921	41	0.1	10	5	12.5 cc	
Aug. 4, 1921	55	0.1	10	6	15.0 cc	Interval of 60 day in which the immunity reactions disappeared.
Aug. 12, 1921	63	0.1	10	7	17.5 cc	
Oct. 10, 1921	122					
Oct. 19, 1921	131			8	20.0 cc	Immunity reactions restored and raised.
Oct. 28, 1921	140	0.04	25			
Dec. 6, 1921	179			9	20.0 cc	Showing the duration and decline of immunity reactions. Period—147 days.
Dec. 12, 1921	185	0.01	100			
Jan. 7, 1922	211	0.01	100			
Jan. 14, 1922	218	0.04	25			
Jan. 28, 1922	232	0.05	20			
Feb. 25, 1922	260	0.06	16			
Mar. 16, 1922	279	0.08	12			
April 3, 1922	297	0.1	10			
May 2, 1922	326	0.14	7			
				(intravenous)		
July 10, 1922	395			10	10.0 cc	Serum used in human cases of glanders.
July 17, 1922	402	0.0025	400			
Sept. 18, 1922	465	0.01	100			Serum used in human cases of glanders.
Jan. 15, 1923	584	0.02	50	11	15.0 cc	
Jan. 19, 1923	588	0.01	100			
Jan. 20, 1923	589			12	30.0 cc	
Jan. 26, 1923	595	0.002	500			
Jan. 31, 1923	600	0.002	500			
Feb. 7, 1923	607	0.002	500			

Subsequently to the immunization experiments herein recorded, this horse has received, during February, March and April, six intravenous injections of a suspension of *B. mallei* subjected to different degrees of heat, commencing with the first injection at 100° C. and finishing with the last at 50° C. The serum titer during this period fluctuated between 0.005 and 0.0016 (200 to 800 units). During May and June two intravenous injections of a living and very virulent culture of *B. mallei* have been given,—(small intraperitoneal inoculations into guinea pigs cause death in seven to ten days). No clinical evidence of glanders has been manifested up to the present date; the complement-fixation titer of the serum maintains itself at about 0.0025 (400 units), while the agglutination value lies between 1:3000 to 1:5000; periodical blood inoculations into guinea pigs have all proved negative.

Glanders, fortunately, is not a common disease of man. But,

has been stated by Robbins,⁵ in his analysis of 156 cases collected from the literature, "it is to be remembered that the published cases of chronic human glanders are but a small proportion of those which have been correctly diagnosed, and there is reason to fear that the vast majority of such cases of glanders in man have been included under some other heading in mortality statistics." "The curability of chronic glanders," Robbins states in his conclusions, "has been greatly over-estimated. Scarcely six per cent of these cases were definitely cured. The duration, including many incomplete cases, averaged fourteen and one-half months. It varied between six weeks and fifteen years".

In speaking of a cure in human glanders one must be very guarded and take into account the tendency to remissions after periods of quiescence. However, the results obtained in the three cases dealt with in this paper certainly indicate that specific serum treatment has a high and definite value in promoting a cure of this gruesome malady.

REFERENCES

- ¹Watson, E. A. and Heath, L. M.: Jour. Amer. Vet. Med. Asso., LXI (1922), 5, p. 503.
²Bell, Gordon: Jour. Can. Med. Asso., XIII (1923), 3.
³Brocq-Rousseau, Forgeot and Urbain: Am. Inst. Past., XXXV (1921).
⁴Mohler, J. R., and Eichhorn, A.: U. S. Dept. Agri. Bull. No. 70, April 15, 1914.
⁵Robbins: Studies from the Royal Victoria Hospital, Montreal, Vol. 2, No. 1, 1906.

DISCUSSION

CAPT. R. A. KELSER: One of the most striking things in Dr. Watson's paper is the seemingly small dose of serum that was administered in connection with these cases of glanders in man, and I would like to ask Dr. Watson if there was any particular reason for not giving larger doses?

DR. WATSON: In the first case mentioned serum-treatment was commenced when the patient was in a state of collapse with nausea, vomiting and headache; the pulse rate was very slow, and the physicians proceeded very cautiously in the administration of the serum. However, in three or four days they were apparently getting a rapid response, and they did not push the treatment as far as they might have done.

Dr. Jackson says, in a letter, that he certainly would start another case with at least five cubic centimeters and probably double or treble that amount. He regretted afterwards, in this first case which occurred, that he did not give a more intensive treatment. The case had been running for one year before treatment was started and has at the present time recurred, although it is healing up again, as he told me in his last letter, and of course more intensive treatment is being given. In the other cases, glanders was diagnosed at the outset, on the appearance of the first lesions, and the administration of the serum immediately afterwards, though in small doses, gave very quick results.

CAPT. KELSER: I have raised the point because in connection with anthrax in man we have had occasion to furnish serum for human use, and the smallest dose recommended has been 35 cc, and I have knowledge of several cases where they gave as much as 150 cc intravenously. In one or two cases they had serum-rash, but in no case that I know of did they have a typical anaphylactic shock following the initial injection.

CHAIRMAN REED: Are there any further questions, or is there any further discussion?

Of course, we know that glanders is not such a common disease in human beings, but it is, as Dr. Watson hinted, I believe, far more common than is publicly realized.

BOVINE INFECTIOUS ABORTION: SOME LABORATORY FINDINGS AND CONCLUSIONS WHICH PUZZLE THE PRACTITIONER¹

By W. L. WILLIAMS, *Ithaca, N. Y.*

Veterinary science constantly increases in its scope. It is becoming more and more impossible for a veterinarian to attain high proficiency in both laboratory and clinical fields. Yet the solution of each important problem demands the application of both clinical and laboratory knowledge. It falls to the lot of the practitioner to make the final application of veterinary science to the control or prevention of disease. A highly essential part of such knowledge is derived from the laboratory. In turn the need for laboratory investigations is learned through the clinician. Efficient veterinary service is possible only so far as clinicians and laboratory men work together with mutual understanding and sympathy. In no veterinary field is this more essential than in the genital infections interfering with reproduction. In this problem abortion occupies a conspicuous place.

Beliefs upon abortion are dependent in part upon tradition and partly upon modern research. In tradition, the causes of abortion were cosmopolitan. There were major groups of causes each comprising an infinite variety of minor elements. They included mechanical injuries (falls, blows), psychic disturbances (fright), weather influences (heat, cold, drought, rainy weather), foods (damaged and undamaged of every known species), water (cold, stagnant), infectious diseases (foot-and-mouth disease, tuberculosis). When a more concrete conception of contagion developed, there arose the belief in one great dominant infectious disease, which invaded the uterus of the pregnant female, destroyed the fetus or fetuses and caused their expulsion. Traditionally, it was an infection affecting only the pregnant uterus, the intra-uterine young or both. It caused all, or practically all, abortions due to infection and was responsible for nothing but abortion. It occupied an unique, if not mysterious position in pathology. With the development of bacteriology, breeders and veterinary practitioners looked forward eagerly to the identification of this traditional micro-parasite, trusting that the infection would then be brought under effective control. The honor of the

¹Presented at the sixtieth annual meeting of the American Veterinary Medical Association, Montreal, Canada, August 27-31, 1923.

discovery of this prophetic bacterium fell to Professor Bang in 1895.

Since the discovery of the *B. abortus*, by Bang, researches upon abortion have been directed almost exclusively along bacteriological or laboratory lines and almost wholly confined to the Bang bacillus. Clinical observations have been virtually abandoned or the records of them have been submerged beneath the avalanche of laboratory publications. The general results of laboratory investigations during the past twenty-eight years have included: (1) a contraction in the volume of abortions believed due to other causes than infection, with a corresponding expansion of contagious abortion; and (2) a growing modification of the belief that abortions due to contagion were necessarily all caused by one infection.

The biology of abortion has dominated the field to the exclusion of important clinical and macroscopical post mortem studies. The emphasis has been placed upon what bacterium causes abortion, not upon how infection leads to the expulsion of the fetal cadaver. The failure to take into account the manner in which abortion is brought about by bacteria has left the veterinary practitioner and the breeder in a confused state of mind. If either breeder or practitioner were asked in what manner infection causes abortion, he would as a rule be wholly unable to explain. During the past nine or ten years, I have recorded the autopsic findings upon a number of pregnant females apparently ready to abort, and upon a considerable number which were destroyed immediately after having aborted. In all these there was found a definite and intense endometritis at the cervical end of the uterus. Radiating therefrom toward the ovarian extremity, the inflammation gradually diminished or disappeared. Clinicians with experience in bovine practice know perfectly well that retained fetal membranes, which so often accompanies abortion as well as calving, begins at the cervical end of the uterus and the process of detachment is last completed by maceration or otherwise at the apex of the horn.

Based upon the very scant available clinical data the natural conclusion is that cervical endometritis is a constant and essential lesion in abortion. No data tending to refute this conclusion have been recorded. Still it remains a vital question in the intelligent comprehension of abortion. Its final solution must rest chiefly with the laboratory worker because it is he to whom the opportunity comes to slaughter aborters immediately after

the act and make a careful study of the lesions present. If cervical endometritis is in fact the basic lesion of abortion, and if it be determined that such lesion is produced by infection only, then an important foundation will have been established upon which a clearer conception may be built. The absence of such a foundation is largely responsible for the existing confusion and uncertainty. It is desired to discuss some of the laboratory teachings which puzzle the clinician, in the hope that there may be brought about a clearer understanding.

THE GENERAL DISTRIBUTION OF ABORTION

Some form or forms of destructive genital disease causing many abortions have existed in all lands from the beginning of history. Regardless of this fact, there is met again and again categorical statements such as "The disease, (contagious abortion) has been present for many years in this country (United States) and has now spread to every state in the Union." The reader is justified in assuming the statement to mean that abortion has recently invaded some unnamed states or territories. There is no intimation that it has yet invaded Canada. Such statements, though common, are confusing. American cattle are derived from Europe, in every corner of which abortion has been common and serious throughout history. Cattle could not be brought to America without infections causing abortion in their native lands, and cattle could not be taken from one state to another without carrying their genital infections along.

Naturally some breeders or groups of breeders may, through misconception or self-interest, claim that certain herds are free from contagious abortion. If the term is restricted to abortions caused by one individual organism and the diagnosis is based upon a given method, the contention might sometimes be true. It has been stated that Channel Island breeders claim their herds free from contagious abortion. But they abort liberally on shipboard and after their arrival in America without known exposure to a new contagion.

It is unfortunate and confusing that such statements should be made by highly influential laboratory workers. Unless supported by evidence more conclusive than any yet published the statements grossly mislead breeders and practitioners. It would be unfortunate if the officials of Colorado having legal power to do so should quarantine against New York cattle because of contagious abortion. Certainly a Colorado breeder purchasing

cattle in New York needs be careful to select animals from the cleanest herds, but he should avoid concentrating his attention so closely upon the dangers of introducing abortion from New York that he neglects the abundant genital infections already present in the cattle of his own state.

THE FREQUENCY OF ABORTIONS IN HERDS

It is impossible to state with accuracy the absence, in herds, of infection capable of causing abortion. Infected and non-infected herds are often mentioned but a supposedly non-infected herd may suddenly be devastated by a storm of abortion without a trace of evidence of introduction. What is usually meant is that so far as the speaker knows the *B. abortus* is not present. The hearer perhaps generally understands him to mean that no infections are present competent to cause many abortions or other serious interferences with reproduction. The breeder may categorically deny the recent occurrence of abortion from contagion in his herd, accrediting them all to accident, yet vehemently believe a corresponding number of abortions in the herd of a neighbor as proof of a highly dangerous infection.

The practitioner commonly knows only of those abortions resulting in dystocia or retained fetal membranes or which otherwise distinctly alarm the owner. In other cases the owner keeps his own counsel, hopes for the best and forgets.

Laboratory workers are almost the sole molders of public opinion upon abortion. They prepare essentially all the bulletins. These go to almost every breeder and veterinarian in the nation. The laborator accepts the statement of the breeder that he does not have or has not had contagious abortion in his herd and in his reports and bulletins speaks of such non-infected herds as actually having a tangible existence. As a rule, the laboratory worker is the most exacting of all men in his details but in this particular place he accepts, and repeats as a scientific fact, very questionable hearsay evidence. If a breeder wishes to compute the reproductive efficiency of his herd for a year he must first determine correctly the number of females of breeding age on hand at the beginning and end of the year, and also all those which have entered or left the herd during the period with the duration of their stay. He must determine what pregnancies existed at the beginning and end of the year and the duration of each at the time of inventory. When to these are added the

number of healthy calves produced during the year, he has the required data for computing his results.

Such is not the method of most breeders and laboratory workers. They too largely base their computations upon the number of fetal cadavers known to have been expelled. The expulsion of embryos one-half to one inch long is occasionally observed and automatically is classed as abortion. Perhaps fifty or more such embryos are expelled unseen for each that is observed but they cannot enter into such computation although the loss in reproduction is identical.

In any intelligent computation of breeding efficiency, abortions have widely differing values. If a cow expels a fetal cadaver at four weeks, the membranes accompany it, uterine discharge is scant and with intelligent handling she may be in safe breeding condition in another four weeks, or a total loss of eight weeks. If, however, she expels a fetal cadaver at forty weeks, the severe metritis, already present, grows worse, the fetal membranes are retained, her life is in definite peril and her breeding life in even greater jeopardy. She can scarcely be ready to breed again until at least twelve weeks have elapsed, a total loss of breeding time of fifty-two weeks, or six and one-half fold as great loss of time and even greater comparative danger to physical and reproductive life. The prevailing method of computing all breeding losses upon the ratio of abortions to births is grossly misleading and unworthy to be classed as scientific. It is worse for one cow to abort at forty weeks than for six cows to abort at four weeks.

Laboratory workers have injected into their method of computing reproductive efficiency another element which defies all efforts of the clinician to understand. In recording the results of breeding under experimental attempts to cause or to prevent abortion, they submit three groups; *sterile*, *aborted*, and *calved normally*. The line between *sterility* and *abortion* is clear enough. If a calf has not been born and it is not known that a fetal cadaver has been expelled, the diagnosis of *sterility* is beyond cavil. If it is known that a fetal cadaver was expelled, there can be no question about abortion. Between abortion and physiologic birth, the practitioner constantly encounters an endless variety of pathologic states which pass one into another imperceptibly. The laboratory worker steps abruptly from abortion to "calved normally" with no provision for the intervening gradations, and not the faintest intimation is given where the dividing line is drawn.

The practitioner habitually encounters premature birth which is in contact on the one hand with abortion, on the other with full-term birth. Perhaps most will agree that when a calf is born at less than 265 days, it is premature and that if it is over 275 days it is full term, leaving a debatable zone of ten days. Cows which calve prematurely commonly continue to suffer from endometritis which caused the premature expulsion and frequently have retained afterbirth. The prematurely born calves frequently die from sepsis, dysentery or pneumonia. Those which survive are generally undersized and when heifers reach breeding age they are largely sterile or abort in first pregnancy. Laboratory workers do not state whether they class these as "aborted" or "calved normally."

The clinician is summoned to attend many cows with a duration of pregnancy of 275 days or over in which parturition is slow owing to the presence of metritis. The fetus may be dead or extremely ill so its reflexes are depressed or destroyed and it fails to assume that physiological attitude which renders birth practicable. Or the metritis present causes uterine inertia which prevents that organ from performing its part in the expulsion of the fetus, and makes obstetric aid desirable. After the fetus has been expelled or removed, the underlying metritis persists and perhaps the fetal membranes are retained. The fetus may be expelled, dead or mortally ill or may break down with dysentery in an hour or two.

I have elsewhere shown² in a herd where abortions were frequent and genital infections were virulent, that parturition at or about full term required anywhere from 30 minutes to 35 hours, sometimes with final resort to obstetric aid, and that the expulsion of the afterbirth required from seventy minutes to thirty-six hours, with aid in the tardier cases. Between such extremes were all the variations the numbers would support. The clinician encounters these variations constantly, he believes some of them are physiological, he knows perfectly that many of them are not. Apparently, however, the laboratory worker designates all these as "calved normally." These and other variations in parturition are observed constantly by the practitioner, far more frequently than he sees abortion and in herds where an abortion rate of twelve to fifteen per cent of pregnancies prevails, he sees far more pathologic than physiologic births. If laboratory workers intend to say that all pregnant cows which do not abort, calve physiologically, clinicians cannot accept the

statement as true. If it is meant by "calved normally" that the calf was expelled, or removed by traction, embryotomy or otherwise and that the cow and calf each lived or died according to chance, then the term is meaningless. To state that in a large herd or group of herds a certain percentage of females were sterile, another aborted and that the remainder *calved physiologically* is such a flat contradiction to all clinical experience that it cannot be understood.

It would enormously reduce confusion to breeders and clinicians if in their recorded data, laboratory workers would divulge the average duration of time required for the production of a calf in a herd or group of herds, the duration of parturition, and of the expulsion of the fetal membranes along with the health of the cow and calf at say five days *post partum*. Such data would not reveal the number of fetal cadavers expelled, seen or unseen, but what is infinitely more valuable, it would indicate the sum total of the interferences with ideal reproduction and afford a secure scientific basis for their study. This would fix the biologic cause of neither sterility nor abortion but would establish an understandable point of departure for their determination.

When a laborator speaks of a non-infected herd, the clinician holds no key to his meaning. This may be well illustrated by two references to Sir John M'Fadyean. In one case³, thirty-nine heifers in first pregnancy were driven three and one-half miles by a boy and a dog. In litigation which resulted it was testified that at intervals of from 36 to about 180 days after the drive, 11 (28.2%) of the heifers aborted. Eight (20.5%) calved prematurely. At least 48.7% of pregnancies terminated pathologically. Basing his conclusions upon blood tests of some of the animals, M'Fadyean testified that in those cases (and presumably also the others) contagious abortion was not present. Technically it was a non-infected herd.

In a series of highly interesting contributions upon the elimination of contagious abortion from herds through the removal of infected individuals by means of blood tests, one large herd⁴ is especially mentioned from which M'Fadyean believed he had eradicated the infection within one year. His records show that numerous abortions occurred in the resulting non-infected herd, the causes of which were undetermined. The comparative frequency of abortions in the infected and non-infected state is not revealed, and it is not stated whether the reproductive

efficiency of the herd was increased or decreased by the eradication of contagious abortion. So it follows that neither practitioner nor breeder has any conclusive evidence of the breeding value of a herd designated as non-infected by the prevailing standards.

DIAGNOSIS

When abortion occurs in a herd the prudent owner is interested in a reliable diagnosis. Tradition has supplied him with a belief in such a wide variety of causes, that he desires to learn the identity of the one responsible in his case. The laboratory workers are substantially agreed that accidental abortions are of no economic interest and except that recently some of them attach importance to abortions believed due to a vibrio, they quite unitedly agree that infections other than the Bang organism are unworthy of consideration. Hence aside from the recent converts to the belief that vibrio infection is of scientific and economic interest, there is but one cause of abortion in cattle worthy of attention; that due to *B. abortus*.

This produces immediately an extremely puzzling dilemma for the practitioner. The owner desires a differential diagnosis. The practitioner is confessedly and utterly incompetent to make the diagnosis. The owner knows only that the abortion has occurred. The laboratory worker is the only individual who claims to be able to differentiate, and upon him the practitioner must rely for a decision.

Referring again to M'Fadyean's testimony³ he convinced the jury that the abortions in question were not due to contagious abortion. This left the practitioner in charge in a decidedly sorry predicament. He must then decide between accidental abortion or abortion due to an infection of no consequence.

It was hazardous for him to diagnose accidental abortion. He could not readily explain to his client why accident should cause the fetal death at periods of 36 to 180 days subsequent to the drive when among born animals fatal accidents generally destroy life immediately or within a few days. In born animals fatal accidents leave visible marks, but none appeared on the fetal cadavers. He might have said that the violence had caused detachment of the placentae and thus induced fetal death but probably most of the heifers had retained, instead of prematurely separated, fetal membranes. He had no opportunity to destroy the aborting heifers immediately and examine their uteri. Only

laboratory workers, in public service, working upon experimental or publicly owned cattle, have opportunity to destroy a cow immediately after aborting and to make an autopsy. Had he enjoyed that opportunity and killed some of the aborters at once, he would have found, according to all records upon this phase of abortion, an endometritis which was most intense at the cervix and thence radiated toward the ovarian end of the uterus. Then he would have been puzzled to explain the uniform occurrence of cervical endometritis referable to accident. No laborator or other investigator has yet described the post-mortem lesions of accidental abortion and no one has explained or tried to explain how mechanical violence could cause abortion.

If the practitioner had resorted to the other alternative and ascribed the 28.2% of abortions to an infection of no consequence, his path would have been equally puzzling. Few veterinary practitioners possess the eloquence to convince the owner that an infection causing 28.2% of abortions and 20.5% of premature births is of no consequence. If the owner is so inquisitive as to inquire concerning the identity of the inconsequential bacillus, the practitioner is wholly at sea. Except for a few recent believers in vibronic abortions, the laborators virtually all assert that no proof exists that other bacteria possess such powers.

Even if the practitioner constructs a diagnosis which soothes his own conscience, his puzzle is not yet solved. He has difficulty in describing how to handle the herd. Those laboratory workers who manufacture abortion remedies have none on sale for accidental abortion. The official laboratory worker offers no advice for the control of abortions due to infections of no consequence. If the genuine bovine infectious abortion is diagnosed, there is still confusion ahead. The laboratory workers largely teach at present that the most promising, if not the only, remedy for contagious abortion is more of it; that on top of the infection present, more is to be added to produce valuable immunity. Some of them say, and the practitioner needs explain the logic of it to his client, that after a cow once aborts, she is generally immune to the Bang organism, but she may abort the following year from some other infection. It is, therefore, important that the cow be given a large dose of living abortion bacilli, soon after she aborts the first time, in order to protect her against a subsequent abortion due to other bacteria. If the practitioner can surmount his misgivings and recommend more abortion infection to destroy that which is present, the breeder is fairly susceptible the first

time, rather skeptical the second and when he advises the living cultures a third time, he is liable to find his client as immune to advice as his cows are to a third abortion.

So it is that abortion, as taught generally by laboratory workers, is the most perplexing and humiliating problem the practitioner has to face. In other veterinary fields the clinician conscientiously regards himself as scientifically informed and competent to aid his client but from the field of infectious abortion he devoutly wishes he might escape.

In the diagnosis of contagious abortion the most practical method without sacrificing animals is presumably by the agglutination or complement-fixation tests. In the application of these tests to abortions occurring in clinics such as the ambulatory clinic of the New York State Veterinary College and others, combined with culture searches and guinea pig inoculations from the abort and its membranes, the presence of *B. abortus* is recognizable in about 50% of cases. But in many of these other bacteria are also present. What relation, if any, they have to the abortions is not known.

The blood of most calves at birth will not agglutinate at 1 to 10. Laboratory workers fix various standards for diagnosis, from 1-25 up to 1-100 and even higher. It is a purely quantitative test and each laborator is a law unto himself. There is no proof that an agglutination of 1-10 does not indicate one-tenth as severe infection as 1-100. Admittedly, the 1-10 agglutination generally indicates nothing serious while 1-100 does, but that is a question of prognosis. Carpenter⁵ has recently shown that when young calves are fed upon abortion-infected milk, the bacteria are recoverable from the lymph glands about the pharynx. Their blood did not react to the agglutination test. It was not shown that they caused permanent infection. They were healthy calves, apparently able to overcome the amount of infection to which they were exposed. This must often be true because most dairy calves are exposed, so that uniformly permanent and destructive infection would mean the extinction of domestic cattle.

Detre and Rohonyi⁶ studied fifty-two animals by agglutination test and by smears from their vaginae. In sixteen of these abortion bacilli were not recovered from the vaginae. In five (31%) their blood agglutinated at 1-10 up to 1-200, while in eleven (69%) the agglutination titre was 1-400 up to 1-3000. Abortion bacilli were recovered from the vaginae of thirty-six animals. In

twenty-eight (78%) of these, the blood agglutinated at 1-10 up to 1-200 and in eight (22%) the agglutination titre was 1-400 to 1-3000. In other words, those animals from which the bacteria were not recovered from the vaginae showed an average agglutination titre of 1620 as compared with 440 in those yielding bacilli from their vaginae. They offer a plausible explanation for the phenomena which has no relation to the present purpose.

There has long been known a severe disease in man, termed undulant, Malta or Mediterranean fever. It has been concluded, apparently upon indisputable evidence, that the disease is due to the ingestion of goat's milk containing the organism designated *Micrococcus*, or *Brucella melitensis*. The disease is seen in Texas and other southwestern states where milch goats are common. Mohler and Eichhorn⁷ assert that the melitensis organism is pathogenic for sheep, goats, cattle and horses. They state "The most important symptom which is observed in goats affected with Malta fever is the frequency of abortions which result in the course of the disease. Some authors estimate that expulsions of immature fetuses occur in 50 to 90% of the pregnant animals, and abortions in affected animals reoccur also during the succeeding and even at the third gestation following the infection." This reads strikingly like a paragraph from a dissertation upon bovine infectious abortion. Writers upon medicine relate that in undulant fever, men commonly suffer from orchitis, which is suggestive of the orchitis noted in bulls during contagious abortion.

Most laboratory workers declare that by agglutination and complement-fixation tests, smears, cultures and guinea pig inoculations they are able to recognize safely and positively *B. abortus* infection. Some eminent bacteriologists deny this. Evans⁸ made exhaustive comparative studies of the organisms of cattle abortion and Malta fever, the results of which have been recorded in detail. She took two groups of 4 pregnant guinea pigs each and inoculated one group with the abortion, the other with the Malta fever organism. Within a few days, three (75%) of each group had aborted. She could not differentiate the two organisms morphologically, culturally or by the agglutination and complement-fixation tests. Meyer and Shaw⁹ after a very extensive study of the two organisms say "A comparative study of 21 cultures of so-called '*Micrococcus*' *melitensis* obtained from various sections of the world and of 32 cultures of *B. abortus* (Bang) isolated in this country and England justifies the follow-

ing conclusions: The causative organism of undulant fever of man and of Malta fever in goats cannot be distinguished morphologically or biochemically from the organism responsible for infectious abortion in domestic animals." They found that in old cultures there was a slightly deeper pigmentation with the Malta fever than the abortion organisms but this was merely quantitative and recognizable only when two cultures of the same age were carefully compared. Meyer, Shaw and Fleischner¹⁰ further showed that the inoculation of guinea pigs gave the same results with each organism but a larger dose of *melitensis* than *abortus* was required to cause the classic changes in liver, spleen and other tissues. The two organisms also caused undulant fever in monkeys, though it required larger doses of *abortus* than of *melitensis* to make the monkeys sick. They state: "Eliminating all conceivable sources of error, the data which will be presented conclusively demonstrate that *B. melitensis* can provoke in a certain percentage of guinea-pigs an infection indistinguishable from abortion disease." Here is a most intricate puzzle for the veterinary practitioner.

Each infection causes abortion and both are pathogenic for cattle, goats, sheep and horses. Kennedy, cited by Zeller¹¹, records that the blood serum and milk of many of the dairy cows, in the vicinity of London, responded to the agglutination test for Malta fever. This confused Kennedy greatly and caused him to seriously doubt the test, as it was in absolute conflict with clinical observations. People using the milk did not contract Malta fever.

Health authorities are at present agitating the control of undulant fever in man by discontinuing, or controlling the use of raw milk from goats. Apparently it is impracticable to differentiate between Malta fever and abortion infection and each is pathogenic for goats and cows. In fact some high authorities have ventured to suggest that Malta fever of man is really due to a highly virulent strain of abortion bacillus acquired by its habitat in the goat, just as others think that swine abortion is due to the cattle abortion bacterium of exalted virulence. The goat industry has acquired considerable importance in the United States and some members of our profession are deeply interested in goat diseases. With the present knowledge of Malta fever and its indistinguishability from cattle abortion, any formidable movement to prevent undulant fever in man

by the control of Malta fever in goats, will prove highly perplexing to veterinary practitioners who may be involved.

Malta fever is not alone in supplying a puzzle in the abortion diagnosis problem. Fontaine and Lütje¹² applied the agglutination and complement-fixation tests for bovine infectious abortion to 3419 horses, with seventeen (0.5%) reactions at a titre of 1-800 or over. Twelve (70%) of the reactors had fistulous withers. There were 101 animals with fistulous withers with 11.9% of reactions and 3318 free from fistulous withers with 0.15% reactions. The proportion between reacting horses with and without fistulous withers was 79:1. After recovery from the fistulous withers the horses were negative to the abortion test. Short bacteria were obtained from the abscesses of four horses, which they were unable to differentiate in smears or cultures from the Bang bacillus. A few samples of blood from horses with fistulous withers have been tested recently in this country for abortion infection and thus far appear to substantiate the findings of Fontaine and Lütje.

While a large group of laboratory men, who are preeminently responsible for the current beliefs of clinicians and breeders regarding contagious abortion assert that they can definitely diagnose the infection by laboratory methods, a very small group of eminent workers are equally positive that it is impracticable. The first group submits no data in support of its contention, the second offers abundant convincing evidence. Based upon available evidence it may be safely said that the bacteriologist must identify the bacterium before him upon his knowledge or belief regarding the species of animal from which it was derived. If he knows or thinks it emanated from a cow, it is *B. abortus*, from a goat, *M. melitensis* and from a horse, a bacillus found in some cases of fistulous withers.

Horses, cattle and goats are frequently in intimate association. *M. melitensis*, *B. abortus* and probably the bacillus seen in fistulous withers is each infectious for all three species and may therefore pass from one to the other so that a bacterium derived from one of these animals may have invaded it only recently from one of the other species. When Kennedy¹¹ found that the blood and milk of a large percentage of dairy cows about London reacted positively to the test for Malta fever he escaped falling into serious diagnostic error only by the remoteness from any center of undulant fever in man. Had the cows been in Malta or other Mediterranean locality, or had cases of undulating fever been

developing in London, all the reacting cows would have been condemned.

BIBLIOGRAPHY

- ¹An. Rep. U. S. L. S. S. A., 1922, p. 92.
- ²Williams, W. L., Researches upon contagious abortion of cattle. An. Rep. N. Y. S. Vet. Col., 1914-1915, p. 88.
- ³M'Fadyean, Sir John, Testimony in Chadwick vs. Gorman. Vet. Rec., Mar. 30, 1912, p. 621.
- ⁴M'Fadyean, Sir John, Researches regarding epizootic abortion. Jour. Comp. Path. and Ther., 34 (1921), p. 48.
- ⁵Carpenter, C. M., Bacterium abortum invasion of the tissues of calves from the ingestion of milk. Unpublished. Presented at meeting of the New York State Veterinary Medical Society, July, 1923.
- ⁶Detre and Rohonyi. Ueber die Diagnostik des infectiösen abortus des Rindes mit Hilfe der Agglutinations- und Mikroscopischen Untersuchung. D. T. W., 38 (1922), p. 345.
- ⁷Mohler, J. R. and Eichhorn, A., Malta fever in Texas goats. Twenty-eighth An. Rep. B. A. I., 1911, p. 119.
- ⁸Evans, Dr. A. C., Further studies upon Bacterium abortus and related bacteria. Jour. Inf. Dis., XXII (1918), p. 580.
- ⁹Meyer, K. F. and Shaw, E. B., A comparison of the morphologic, cultural and biochemical characteristics of *B. abortus* and *B. melitensis*. Jour. Inf. Dis., XXVII (1920), p. 172.
- ¹⁰Meyer, Shaw and Fleischner. ib. XXXI, Aug. (1922), p. 161.
- ¹¹Kennedy, cited by Zeller, H., Weitere Untersuchung ueber das Seuchenhafte Verwerfen des Rindes., Arch. W. and Prakt. Tierh., 49 (1922), p. 65.
- ¹²Fontaine und Lütje, Beitrage zur specifitätsfrage der complementbindungsmethode bei der rotskrankheit. Zeitschr. f. Veterinarkunde, Vol. XIII (1919), p. 2.

DISCUSSION

PRESIDENT WELCH: Gentlemen, you have heard one of the most important papers of the meeting. It is open for discussion.

DR. D. H. UDALL: I was very much interested in this paper. Dr. Williams brought out some points of far-reaching significance, not only from a professional standpoint, but perhaps from a social standpoint, and without any doubt from a legal standpoint. Almost daily, certainly at least weekly, veterinarians in practice are asked by owners, following an abortion, following sterility, following retained placenta, "Is this contagious abortion?"

We have come to assume that he means infection with *B. abortus* (Bang). How are we to answer correctly? He has received through the press certain impressions as to the significance of infection with *B. abortus* (Bang) and of the proper method of handling such infections. Often his conception of the proper handling of these cases is at variance with the experience of the clinician. It is important, therefore, for the clinician to have some reliable bacteriological method of diagnosis.

There is nothing definite on the extent to which a clinician or a laboratory man may go with respect to the collection of material or the extent of its examination. We have definite knowledge of the amount and kind of material to be obtained for making a diagnosis of tuberculosis. The laboratory man has very definite knowledge of his limitations concerning laboratory examination of that material. When it comes to this disease, diseases of the reproductive organs, there are no such limitations.

We do not know after the material has been examined whether an animal is infected with the Bang bacillus. One may assume that the agglutination test is highly efficient. It is not infrequent, in routine examinations of herds, to obtain repeated negative reports upon animals that abort. Upon examination of the placentae of such animals the *B. abortus* organism may be found. One can not always depend upon the blood test, and the same is true of the milk. This experience is not rare. A cow that has given negative agglutination tests on blood examined at three-month intervals may deliver a calf at full time and reveal *B. abortus* (Bang) in the uterine exudate when an examination of the placenta itself is negative. Should such an animal be reported as infected with *B. abortus* (Bang)?

The topic discussed by Dr. Williams is of great importance to the clinician. He must reply to the owner in regard to the nature of infection in the reproductive organs. Responsibility for making an important decision rests upon him. Caution and conservatism should be observed in the wording of laws and regulations intended to control genital infections. The veterinarian needs

to keep the peace with his associates, and he has certain public obligations. It is highly essential that principles finally adopted as effective in the diagnosis of a disease should be sound and free from controversy. Final decision should be withheld until we have knowledge of all of the different phases of the disease.

Articles on abortion often lead one to infer that most of the chronic diseases of the genital organs associated with sterility are secondary to infection with *B. abortus* (Bang). It is not infrequent to find herds where most discouraging infections of the genital organs exist and in which there is no evidence whatever of the presence of *B. abortus* (Bang.) Blood, milk, uterine exudate, placentae and fetuses are negative. Who can say that such a condition is secondary to something that has vanished, or that it is not due to some organism found in the material?

It is not infrequent for a clinician to conduct work where abortion is fairly frequent, and from which no evidence of *B. abortus* (Bang) can be obtained after repeated examinations of the blood and other material.

In the light of the bulk of our present literature such experiences are confusing to the clinician. And when one recalls that cattle owners are more familiar with the literature upon affections of the genital organs than with that of any other system, that much of it is positive, clear and final in its style, it is not difficult to appreciate the fact that clinicians are not only confused, but are sometimes embarrassed. In this connection may it not be appropriate to suggest that less confusion would result if conclusions based upon a large volume of work in a comparatively small field were not extended to cover the entire scope of veterinary medicine, both experimental and natural?

DR. E. A. BRUCE: I would like to ask Dr. Williams if *B. melitensis* is the organism which presumably causes abortion in goats and cattle and undulant fever in man, how it is that on the Pacific coast, as far as I know, at least as far as British Columbia is concerned, I have not had any reports of abortion in goats, or any cases of undulant fever in men, but there is lots of abortion in cattle?

DR. W. W. WILLIAMS: In clinical work the relation between infection by *B. abortus* and the actual incident of abortion frequently becomes very obscure. In one herd with which I came in contact, about three years ago, there were twenty-three mature animals which had given birth to one or more calves. Of these there was only one animal which was negative to the agglutination test for *B. abortus* infection. This animal aborted, whereas the other animals of that group had never been known to abort.

In the past three years the herd has essentially doubled in size. The younger animals which were negative three years ago have since become positive. Yet with the high percentage of positive agglutinations, only two or three abortions have occurred in that whole group during the past three years.

Another instance is that of a herd of about 125 females, in which more or less work upon the genital organs has been done for several years. During the past two to two and one-half years, twenty-one abortions or premature births have occurred. It had been the general practice in this herd to examine the genital organs before service to see that they were normal and also in most cases to administer a uterine douche before service. With seventeen out of the twenty-one abortions or premature births, there had been, however, no examination or treatment before service. Of the remaining four, three had definite clinical evidence of salpingitis and the other a severely indurated cervix, the cervical canal being partially lined with eschar tissue. Thus, out of the twenty-one abortions or premature deliveries, the cause for abortion in four of these cases could be explained by the presence of definite foci of infection. During the same period, there had been over sixty animals in the herd treated before service and these did not abort.

In another herd having about eighty-five mature females, fourteen abortions occurred in one year amongst heifers in their second pregnancies, and with one exception, all of the abortions in the herd were confined to this group. These heifers all having exceptionally healthy deliveries of their first pregnancies, had received no treatment afterwards. Aside from this, it was not possible to point out any difference between their care and handling and that which

the rest of the herd had. The rest of the herd with the exception of the virgin heifers had uterine treatment before service. All of the mature animals had been affected with infectious dysentery one to two months before the abortions occurred, and this may have had some relation to the abortions. The pregnancies of the mature animals, aside from the ones in their second pregnancies, were, however, not affected.

Now it is puzzling to understand in these cases how treatment of the genital organs can prevent an animal from aborting if the infection were *Bacillus abortus*. This organism does not usually occur in the uterus at the time that the organs are treated, and it is not plausible to suppose that the treatment of the genital organs can have any great influence upon foci of this organism elsewhere in the body.

Clinical work cannot be safely conducted upon the basis of what is known about *B. abortus*. One herd may show a vast relation between *B. abortus* infection and the incident of abortion, and the next may just as emphatically deny the relationship.

DR. A. SAVAGE: I should like to ask Dr. Williams, if I may, although it is slightly beside the point, just what he understands by the term "infectious abortion." It seems to me that if one adopts the attitude that abortion is the premature expulsion of a fetal cadaver, then it ceases to be a disease because it becomes the result of several or many different factors. Even the infection factors alone seem bound to include a number of organisms which have been fairly well described, the organism of Bang, that of Dr. Theobald Smith, the organism of M'Fadyean and Stockman and others. If by abortion one is to understand the result of being infected by the Bang bacillus, then it seems that abortion is also to include Malta fever in goats, undulant fever in man, and probably fistulous withers in horses.

DR. B. T. SIMMS: Mr. Chairman, I hardly know what classification I would fall under. I fear I am neither fish nor flesh nor fowl, as I do too much field work to be called a laboratory man and too much clinical work to be called a field man.

There are conditions in my state which are different from those under which Dr. Williams works. I come from the Pacific Northwest but I feel I would like to say a few words about conditions which are obtaining there.

We do have, I assure you, districts that are free from abortion, both by clinical observations and by laboratory tests. By clinical observations I have seen farms in the southern part of the United States, too, which were absolutely free from abortions. By both clinical and laboratory tests we have found not herds, but entire districts, in the State of Oregon, that are free from abortion. Cattle owners, veterinarians and people who are in close touch have advised that there were no abortions in certain of our valleys in the mountainous districts. We have gone in and tested, by blood test, not one herd but the entire group of herds in such valleys and have found no evidence of the presence of the Bang organism.

On the other hand, where abortions have been present, where there has been clinical evidence of some disease that was causing premature expulsion, we have found evidence of the Bang organism.

In at least ninety-five per cent of the tests that we have conducted (and we conduct some few; in the last twelve months we have tested around five thousand cows in the State of Oregon, outside of experimental animals), cows which show clinical evidence of having aborted give us positive tests for the Bang bacillus.

We have found some one or two herds where there were abortions with no evidence of the presence of the Bang bacillus. The test certainly does run parallel to the act of abortion. Of course, I don't say (and I think no laboratory man has ever said it) that all positive reacting cows will abort but we do say most emphatically, in the State of Oregon, that aborting cows will react in ninety-five per cent or better of the cases.

In our state, too, we have observed some of these animals that are premature births and have followed them to maturity. We have found that if they were handled in a satisfactory manner, they would give us negative blood tests after they had passed the age of five or six months. Even though they

have come as early as 245 days, they have lived and from that on up. Those heifers, when they reached maturity, have bred for us and have given birth to live calves. They have bred very satisfactorily; they have given us negative tests and continued negative unless they were exposed to the Bang organism infection.

Gentlemen, I want to emphasize again that I am not referring to conditions in the Middle West or East. I know nothing of the conditions there, but on the Pacific Coast the Bang organism is definitely associated with the act of abortion, according to laboratory tests and guinea pig experiments. We do not have extensive outbreaks of abortion.

DR. UDALL: May I ask a question of the last speaker?

I infer that you base the diagnosis on the blood test and I would like to ask if more than one blood test is required to establish diagnosis, and, if the agglutination test is made, if the conclusions reached are accepted as evidence of reaction?

DR. SIMMS: In our laboratory we make three dilutions in running the agglutination test, 1-50, 1-100 and 1-200. We consider the test positive and that the cow is infected if we get agglutination in two of the dilutions. Occasionally we have made higher dilutions, and observed them fifty-two hours after the test is made, where the animal has recently been infected with abortion. Of course, a negative test today does not indicate that the cow will abort twelve months or fifteen months from now, but it has indicated in Oregon that that cow is not an aborter and will not abort in the next few weeks or within a period of four or five months.

DR. W. L. WILLIAMS: In replying to the first speaker, whose name I do not know, regarding the question of why melitensis and abortion infection are not present in goats in British Columbia, and why there is plenty of abortion in cows, I am quite unable to answer.

As used in the paper, I aimed to limit the term "infectious abortion" to the definition made by the Committee on Abortion of this Association; to the infection by the Bang organism. It could not be constantly so limited; but unless there is something in the context to indicate otherwise, the *B. Abortus* infection is meant.

I am sorry that Dr. Simms did not go farther with reference to the abortion-free herds. I know very well that many breeders are so built that they can forget a great many things and one of the things which they do forget is abortion. Abortion is not common in cows which run in mountains, because there is nobody with them to see the fetal cadaver expelled. That makes a very great difference in the incidence of abortion. We can only count those cases as abortion in which we have some reliable information to the effect that a fetal cadaver has been expelled.

In one large herd where I worked, the animals were running out in large paddocks of several thousand acres each, where the ground was very rough, with numerous boulders and fallen logs. The cattle were not seen regularly and while there was a sixty per cent breeding efficiency, that is, sixty calves per one hundred cows over a period of ten years, there were only about five per cent of abortions, and we had to call the other interferences sterility because it could not be seen.

PUBLICATIONS AVAILABLE

Sir Arnold Theiler wishes it to be known that the publications of the Union of South Africa, on veterinary subjects, are available to any veterinarian or institute making application for same to The Director of Veterinary Education and Research, P. O. Box 593, Union of South Africa, Pretoria. Sir Arnold desires full exchange of publications between the veterinarians of South Africa, the United States and Canada.

THE SIGNIFICANCE OF POST VACCINATION TROUBLE¹

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During the past few years the pages of veterinary journals and the programs of meetings have been so crowded with discussions pertaining to differential diagnosis of swine diseases that the importance of this subject may be readily judged. It is interesting, however, to note that this enhanced interest in diagnosis came almost simultaneously with an increase in post-vaccination trouble cases.

The average practitioner who is favored with a desirable swine practice has been passing through a transitional period. A few years ago he shared the then prevailing belief that cholera was the only serious disease of swine and that the more or less mechanical injection of anti-hog cholera serum and virus was equivalent to a guarantee of future health. He rarely felt it incumbent upon him to warn his clientele that following any form of vaccination there is a small percentage of undesirable complications, that there is a difference between vaccination and immunity, or that the artificially acquired immunity following any form of vaccination is not absolute. Gradually it became apparent that one could not consistently retain this attitude and explain or even understand the altered field conditions which were being experienced. As a result the more astute observers began to attach greater significance to fine points of differentiation and small details which had previously been considered unimportant. As the transition progressed there came the realization that petechiae on autopsy denote a septicemia which may or may not be hog cholera, and that button ulcers indicate bacterial activity which may or may not be associated with hog cholera. This modern doctrine prohibits the belief that all sickness subsequent to vaccination constitutes a "cholera break" while the transition becomes complete with those who diagnose cholera only if the syndrome includes typical history, symptoms and lesions. Such diagnosticians are prepared to explain to their clientele that a certain percentage of individuals vaccinated against any disease fail to become immune on account of immu-

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nological factors as yet unknown. They likewise take into consideration the facts that pre-existing latent infections not infrequently become active when the host is subjected to the influences of a different antigen, or that immediately following vaccination a state of increased susceptibility offers an excellent opportunity for complications which may not be easily diagnosed.

WHEN EXPERTS DISAGREE

Not all members of the profession concur in this modified interpretation of swine diseases and when at the request of the owner a consultation is held to determine the nature of post-vaccination sickness, a difference of opinion not infrequently occurs. In such cases one consultant diagnoses a "cholera break" and advises immediate re-treatment. Our investigations indicate that such a diagnosis is frequently an exhibition of dogmatism based solely upon the presence of petechiae of various organs and entirely disregards the fact that there are lacking other features necessary to make a cholera syndrome complete. The other consultant may diagnose another disease or condition, because he realizes that the petechiae may be due to septicemias other than cholera and because there are observed certain symptoms and lesions which do not symbolize hog cholera. This difference of opinion naturally baffles the owner and frequently results in re-treating herds which we believe do not require such treatment, thereby causing an economic waste and endangering confidence in a valuable and necessary immunizing procedure.

Believing that when hog cholera is erroneously diagnosed and vaccinated animals unnecessarily re-treated, the psychological effects are more harmful than beneficial, there was felt the need of definite information to determine whether or not such cases actually exist. While the literature reveals a few scattered reports of the examination of blood from such cases we were unable to find the publication of any extended investigations pertaining to the subject. Because of these facts the experiments reported herein were undertaken.

Samples of blood were procured from as many cases as possible where swine sickened subsequent to vaccination and where the conditions simulated a so-called "cholera break". Many cases in addition to those included herein were studied but in the majority of those called to our attention a definite clinical diagnosis of some condition other than cholera could be made. In

every case included in this report the outstanding, post-mortem lesion consisted of ecchymoses or petechiation of various organs. In each instance the trouble was considered a "cholera break" by one or more veterinarians while one or more dissented from that opinion. These dissimilar opinions can be temporarily correlated by the statement that each individual selected was suffering from what appeared to be an acute septicemic condition and was bled in the height of the attack. Included in the experiments is the blood of 210 animals collected from nine different states. The serum and virus with which the animals had been previously vaccinated represents the products of two state and four commercial organizations.

METHOD OF PROCEDURE

The animals were bled in as sterile a manner as possible into Mason fruit-jars, the blood defibrinated and taken to the laboratory without the addition of any preservative. The blood and any tissues showing pathological changes were subjected to thorough bacteriological examination. Rabbits, mice or guinea pigs were inoculated with each sample of blood. In every instance two presumably susceptible pigs were inoculated with from five to ten cubic centimeters of the blood under examination. In every case the susceptibility of inoculated pigs, which did not sicken, was proved by the subsequent injection of two cubic centimeters of known virulent virus. In some instances the animals were inoculated with filtered blood but in the majority of cases whole blood was used. Although not shown in these protocols it was interesting to note that there was practically no variation in the results obtained by filtered or whole blood. Whenever filtered blood was used one pig was injected with filtered and the other with whole blood. In every case where the individual receiving whole blood developed cholera, the one which received filtered blood sickened equally as promptly and vice versa.

The two pigs which were inoculated with a given sample of blood were confined in separate, isolated colony-houses throughout the test period, which ranged from eight to ten days. It might be felt that animals inoculated with this blood should have been retained for a longer period. The objections to such procedure are manifold and are offset by the fact that in every instance individuals which did not sicken were inoculated with virus of known virulence and unless they remained healthy for

four days after the virus injection they were considered sick when injected.

PROTOCOL 1—RESULTS OF INOCULATING SUSCEPTIBLE PIGS WITH BLOOD FROM SICK SWINE
VACCINATED 4 TO 30 DAYS PREVIOUSLY

Number of blood samples tested	152
Number in which no virus could be demonstrated.....	122
Number in which virus was demonstrated.....	30
Negative to cholera.....	80.3%
Positive to cholera.....	19.7%

Petechiation of various organs was marked in all animals whose blood was used in these experiments.

The susceptibility of all animals which did not sicken was proved by subsequent inoculations with hog cholera virus of known virulence.

Not included in the above were three cases from cholera-susceptible herds—all proved positive.

Protocol 1 shows a summary of the results following the inoculation of susceptible pigs in the manner described above with the blood from 152 animals which sickened at varying times within thirty days after vaccination. It is therefore indicative of what may be expected in so-called "serum breaks": The detailed charts of the individual tests have purposely been omitted, since they are too voluminous for a presentation of this kind.

It will be observed that of 152 samples tested it was impossible to demonstrate virus in 122 or 80.3 per cent, whereas, 19.7 per cent were positive. The autopsy findings of the suspected animals whose blood was used proved most interesting. Seventy-one per cent of the thirty animals whose blood contained virus showed chronic lesions either of the respiratory or intestinal tract, in addition to the petechiae which characterized all cases. The chronicity of the lesions was such to indicate latent infection and tissue involvement at the time of vaccination and it seems probable that "vaccination cholera" resulted on account of virus being superimposed upon a previously existing, though unobserved, infection. On the other hand, since fifty-one per cent of the negative cases showed a similar condition, it seems reasonable to assume that when the simultaneous treatment is administered to animals infested with parasites or having a latent bacterial infection, that post-vaccination sickness is quite certain to occur. The resulting sickness apparently may be "vaccination cholera" in symbiosis with intense bacterial activity, or the blood may be virus-free, yet the animals present the symptoms and lesions of an acute septicemia.

Protocol 2 shows a summary of the results following the inoculation of susceptible pigs with the blood of animals which sickened more than thirty days subsequent to vaccination. These

animals, as did those in the previous experiments, all showed an acute septicemic condition, while on autopsy petechiae of the various organs was the predominating lesion. These cases may then be likened to so-called "virus breaks". The percentage which proved to be affected with cholera is somewhat higher than in the case of the animals which had been vaccinated less than thirty days. It is felt that a portion of this higher percentage cannot be explained but that some can be attributed to expired immunity, due to the vaccination of young pigs and to the use of insufficient amounts of virus at the time of vaccination. It should be noted, however, that the cases which proved not to be cholera are more than double those in which virus was demonstrated.

PROTOCOL 2—RESULTS OF INOCULATING SUSCEPTIBLE PIGS WITH BLOOD FROM SICK SWINE
VACCINATED MORE THAN 30 DAYS PREVIOUSLY

Number of blood samples tested.....	48
Number in which no virus could be demonstrated.....	33
Number in which virus was demonstrated.....	15
Negative to cholera.....	68.8%
Positive to cholera.....	31.2%

The susceptibility of all animals which did not sicken was proved by subsequent inoculations with hog cholera virus of known virulence.

Petechiation on autopsy was marked in all animals whose blood was used in these experiments. Not included in the above were seven positive cases where the animals were vaccinated when weighing less than forty pounds.

It is interesting to note that there was examined, but not included in the figures in Protocol 2, blood from seven herds where admission was made that the pigs were vaccinated as babies. One hundred per cent of these were positive, indicating the practical uncertainty of lengthy immunity following the vaccination of baby pigs.

Protocol 3 includes the same animals as those shown in Protocol 1 and indicates the day after vaccination on which sickness first became apparent. We were considerably surprised to find that the blood of some of these animals was virus-free in from four to seven days after vaccination. On account of the experiments of other investigators it was expected, regardless of the cause of sickness, that a positive reaction would be obtained in all cases where blood was drawn in four to seven days after vaccination. We have not had an opportunity to follow this lead, but feel that much information might be gained by keeping such animals under observation to determine later whether neutralization or destruction of the virus at such an early date might not result in their failure to develop substantial subsequent immunity. If such proved to be the case, there would be apparent

another potent explanation for "virus breaks", the cause of which so frequently remains in obscurity. The appreciable increase of positive reactions in the blood of animals which sickened from twenty-one to thirty days after vaccination will be noted. It is believed that this is incidental and that the results in this or any of the other groups might be reversed if a like number of samples were tested again. Stated differently, we believe that our records indicate that cholera virus is absent in many post-vaccination trouble cases regardless of the time that those cases occur, but there is nothing to indicate that such negative cases are likely to be encountered in greater proportion at any particular time after the animals have been vaccinated. The outstanding feature of the experiments quoted is the large percentage of cases where the filterable virus was absent in the blood of animals sick with acute, febrile conditions which some diagnosed as "cholera breaks" and which were characterized by petechiation. We feel certain that this will not be construed as indicating that true breaks do not occur. Our experiments indicate conclusively that this unfortunate condition does occur but that in many post-vaccination trouble cases the factor to be reckoned with is not the filterable virus, even though the virus used may have been the devitalizing factor which activated some other condition.

The point has been raised that swine may be affected with

PROTOCOL 3—(SAME ANIMALS AS THOSE IN PROTOCOL 1) SHOWS DAYS AFTER VACCINATION ON WHICH SICKNESS WAS EVIDENT, WITH NUMBER OF CASES NEGATIVE AND POSITIVE TO CHOLERA

Day After Vaccination on Which Sample Was Collected for Inoculation	Number of Samples	Negative to Cholera	Positive to Cholera	Percentage of Negative Cases
4th	3	3	0	100.0
5th	5	3	2	60.0
6th	7	3	4	42.8
7th	13	10	3	76.1
8th to 12th	46	38	8	82.6
13th to 16th	27	25	2	92.5
17th to 20th	28	26	2	92.8
21st to 30th	23	14	9	60.8

cholera while their blood is free from the virus of that disease. We question the ability of anyone to prove such an assertion by any published data. Carriers of the disease cholera have never been demonstrated, although chronically affected animals following partial recovery from acute hog cholera have been

suspected of acting in that capacity. Be that as it may, it is inconceivable that in 122 out of 152 cases the blood of cholera-sick swine would be virus-free. This opinion is strengthened by the fact that only acutely sick animals were used and that their blood was drawn on the day that symptoms were first observed or on the succeeding day. Producers of virus are aware that the most virulent virus is obtained by bleeding cholera-sick swine as soon as possible after the appearance of symptoms, provided the symptoms are accompanied by a rise in temperature. According to present knowledge the blood from all of these cases should be exceedingly virulent if we were dealing with hog cholera.

PROTOCOL 4—BACTERIOLOGICAL FINDINGS

	Strep- tococcus	Staph- ylococcus	Bact. Coli	Bact. Paraty- phosum B.	Past. Suisseptica	Pa. Pyo- cyaneus	Sterile
Blood	11	14	20	24	25	5	41
Lungs	6	2	14	29	52	—	37
Liver	2	—	7	14	8	—	109
Spleen	3	—	4	30	18	—	85
Kidney	1	1	6	11	6	—	115
Glands	2	—	—	16	19	—	103

The question naturally arises as to the cause of the post-vaccination trouble cases where cholera virus was not present. Apparently it will require a tremendous amount of experimental work to determine this point. Naturally enough our efforts first turned to bacteriological studies of the affected animals in an effort to determine the possible presence of pathogenic bacteria or their products. Protocol 4 shows the bacteriological findings in 140 cases in which virus could not be demonstrated. The cases from which *Past. suisseptica* and *Bact. paratyphosum B.* were isolated presented a clinical syndrome which was in keeping with the bacteriological findings. However, in several cases where the clinical picture was equally as suggestive of hemorrhagic septicemia, bacteriological studies failed to reveal any significant bacteria. The large proportion of cases in which it was impossible to demonstrate the presence of any bacteria which might be of etiological significance is impressive. Notwithstanding these results it is felt that before bacterial activity as a cause of post-vaccination trouble cases is relegated to obscurity, that considerably more investigational work is required. It is felt that the condition may not be unlike that

observed in such septicemias of the human as typhoid, where the condition is definitely known to be due to bacterial activity, yet where great difficulty is encountered in isolating the causative organism from the blood stream. At the present time it would appear that some factors other than cholera or bacteriemias play an important part in post-vaccination trouble cases.

While pursuing these investigations it naturally seemed advisable to determine the degree of culpability which should be attached to the serum and virus which was used in vaccinating the animals. It was felt that if the trouble subsequent to vaccination was due to impotence on the part of the products used, this fact could be detected by determining similar cases in other herds in which the same serial lots had been used. With this object in view the records following the use of one hundred million cubic centimeters of serum and six million cubic centimeters of virus were carefully studied. Of the one thousand lots of serum and three hundred lots of virus studied it was found that no trouble of any kind followed the use of over ninety-three per cent. Of the seven per cent remaining not more than two instances of trouble of any kind were recorded against any given lot and in the vast majority such experiences were limited to one herd. Upon investigation the majority, but not all, of these cases proved not to be cholera as is shown in Protocols 1 and 2. It was found that the average lot of serum and virus was used in eighty-four herds and it seems reasonable to assume that if the trouble in one herd was due to any impotence of the products that similar sickness would certainly have resulted in some of the remaining eighty-three herds.

SERUM AND VIRUS RARELY AT FAULT

Although this survey indicated remarkable efficiency on the part of the products used it was decided to investigate still further. In several instances permission was obtained to test the supposed immunity of animals in other herds which had been vaccinated with the same serum or virus used in herds where trouble had occurred and a "break" had been diagnosed. Wherever possible herds which had been vaccinated by the same veterinarian were selected. In several instances the two herds had been vaccinated on the same day, while in a few instances the owner of the two herds was the same but the animals located on different farms. In these cases the animals to be tested were injected with ten cubic centimeters of known virulent virus and

held under observation for two weeks. The immunity of eighteen herds has been tested in this manner and in no instance were susceptible animals discovered. The immunity of other herds was tested by subjecting to hyperimmunization the animals to be tested. Again no susceptible animals were discovered in thirty-six herds so tested.

The obvious conclusion to be drawn from this survey is that in the particular cases investigated the cholera breaks which occurred were not the result of inability on the part of the products to accomplish their purpose, but that the desired results failed of accomplishment because some undetermined factor unbalanced the normal relationship between host and antigen.

SUMMARY

Animal inoculation tests were conducted upon the blood of one hundred and fifty-two animals which had been vaccinated against hog cholera from four to thirty days previously and which were sick with what was supposed to be a "serum break".

The blood of forty-eight similarly affected animals which had been vaccinated for more than forty days was tested in like manner. These animals simulated a "virus break".

Confirmation of the belief that true serum and virus breaks do follow vaccination is offered in this report. However, since 80.3 per cent of the suspected "serum breaks" and 68.8 per cent of the suspected "virus breaks" proved to be some condition other than cholera it seems reasonable to conclude that a large percentage of post-vaccination trouble cases are not cholera.

Petechiation of various organs was the outstanding, post-mortem lesion of all affected animals, thus proving the oft repeated claim that this pathological change does not justify a diagnosis of cholera. Bacteriological studies of the affected individuals failed to divulge as much information as was hoped for. In some cases the clinical syndrome of hemorrhagic septicemia and paratyphoid fever was substantiated by the bacteriological findings, but on the contrary the bacteriological findings of the majority of the cases studied was negative and justifies the conclusion that some post-vaccination trouble cases are due to factors other than hog cholera or bacteriemias.

Our examination of blood from animals which sickened subsequent to vaccination revealed the fact that 19.7 per cent and 31.2 percent respectively were affected with cholera. The same serial lots of serum and virus used in vaccinating the affected

animals were used in eighty-two or eighty-three other herds without any undesirable results. It seems only reasonable, therefore, to conclude that the true "cholera breaks" which did occur were due not to the products used but to principles of immunology not yet appreciated or to technical details of administration which are recognized potent causes of post-vaccination trouble.

There is apparent an urgent need for studies to ascertain the immunological factors which determine the immunity of some individuals and the susceptibility of others following vaccination. In this respect our problem is not unlike that of the physician, who is unable to immunize approximately ten per cent of the children vaccinated against diphtheria by the toxin-antitoxin mixture, or a similar percentage against small pox, although the ninety per cent vaccinated with the same products do become immune. Pending the determination of these factors there should emanate the knowledge that a certain percentage of swine properly vaccinated with potent products fail to become immune to cholera.

DISCUSSION

DR. J. W. BENNER: Mr. Chairman, I have been very much interested in the paper as presented by Dr. Cahill. Some very interesting work has been described, and in a very complete way. We have not had much of this post-vaccination trouble in our swine practice around Ithaca, New York, but I have been in sections of the country where there has been a great deal of it.

I remember in the earlier days of the hog cholera serum work in Kansas, when practitioners were reporting a great deal of this kind of trouble, and of course the question that naturally presented itself was how to overcome it. This question, as such questions usually are, was directed to the Veterinary College, at Manhattan, Kansas, and the advice that seemed to do the most good was to increase the dose of serum. I know by the experience of field men in hog cholera work, and also of practitioners, that in those earlier days of the work, as soon as they began to give the larger doses of serum post-vaccination troubles were not so frequent. This is just one of the conditions that seem to cause post-vaccination troubles. There are, no doubt, a good many other factors that may enter into it.

On this same point, the increase of the doses of serum, as worked out in the cases I have just mentioned, brings to my mind a certain phenomenon that we noticed in connection with our work on hemorrhagic septicemia in swine. In vaccinating pigs against hemorrhagic septicemia, we found that an artificial resistance could be created by the vaccination, so that when a lethal dose of a suspension of living organisms as antigen was administered intravenously the pig would die, but the organism (*Bact. suisepiticum*) could not be demonstrated in the blood; whereas, if the same dose was injected into a pig that had not been vaccinated the organism could easily be demonstrated in the blood after death. We have seen this occur in a very clear-cut, decisive way, and I think it may be an explanation for some of the cases of hemorrhagic septicemia, where typical clinical manifestations and typical lesions are observed, but where the organism cannot be found. In the experiment that Dr. Cahill has described, it seems to me that there may be a grade of immunity present in the vaccinated animals, produced by the serum that has been given, in which the serum has partially neutralized the virus, or perhaps partially destroyed it, so that it cannot be demonstrated in the

blood, even though the individual may be sick at the time such blood is drawn.

As was seen on the charts given, the higher percentage of animals in which the hog cholera virus could not be demonstrated in the blood was where sickness occurred in thirty days time. The grade of immunity from the serum given would naturally be higher at thirty days than later; that is, the passive immunity possessed by serum alone would become weaker as time went on, and I am wondering if a phenomenon similar to the one which I have described is not occurring here—if the grade of immunity in the animal is not one that is changing the virus, so it cannot be demonstrated by subsequent injection into a susceptible pig, but at the same time is causing sickness in the pig from which the blood is drawn for such examination.

These samples were in all cases taken from sick pigs, and not from dead pigs, as I understand it. This is just a point that has suggested itself to me as I have been thinking over the work which Dr. Cahill has presented. It is my belief that there is a great deal in the grade of immunity produced by serum. In administering the simultaneous treatment, we depend on the serum to protect the health and life of the animal from the virus. Therefore it is of the utmost importance that we should pay close attention to the dose and the quality of serum used in this method of hog cholera vaccination.

DR. R. P. MARSTELLER: I would like to ask Dr. Cahill if he has any data on the approximate percentage of animals in the herds that show symptoms of infection.

DR. CAHILL: That is one of the points, unfortunately, on which we are unable to get as much information as is needed. I have talked with field men in practically every State in the Union regarding such cases, and find that in the majority of such instances the herd is retreated with serum and virus before there is any opportunity to determine the percentage of animals which would really sicken.

It is our opinion that in these negative cases the proportion of animals which would sicken would be small, and that retreatment received credit for stopping a "break", when in reality few, if any, additional animals would have sickened had they not been retreated. In other words, it appears that this is an individual rather than a herd proposition. If this be the case, retreating not only makes impossible the procuring of valuable data but unnecessarily injures the standing of the simultaneous treatment.

The work Doctors Benner and Birch have done on this subject is such as to warrant a very careful consideration of any opinion which they may express. We do believe that there is a great deal in what Dr. Benner says, but the thing that we are unable to understand is why a small percentage of these individuals would lose their immunity while immunity is retained by others.

Apparently, field investigators overlook the fact that a certain percentage of individuals properly vaccinated with products which are fully potent fail to become immune to cholera. Why they exist, and how we are going to overcome the trouble is, of course, a problem.

DR. E. R. STEEL: The subject of "breaks" is very interesting to me. I agree with Dr. Cahill in many of his remarks, but there are a few things to which I might take exception. In handling serum, I buy it by the test. In that way I have an opportunity to watch it under different conditions in different herds. Then I keep a record of each herd treated. In buying virus, I try to get that in quantities of two or three thousand cubic centimeters, so that I have a record on possibly a thousand head. I have thought of checking up the virus, for that would be the real way to do, although we have to place our confidence more or less in the producer.

This summer I have had an opportunity to watch these "breaks". I started in with a serial and I got along with the serum fine, until later in the summer. We got into that period where the pigs were beginning to show secondary infections of all kinds, pneumonia and one thing or another, and then I began to have "breaks" with this same serial, just a few isolated cases along, maybe three or four pigs out of a hundred. In my own mind I know that these secondary conditions do influence the production of immunity.

On the other hand, I am not of the opinion that all lots of serum and virus

are absolutely all right, and that we can't question them on account of government inspection. I know something about serum and virus production, through engaging in it. I know there is a good deal of temptation when we have perhaps a thousand dollars worth of serum on test, to get that test by, if possible. It is also said that our test is not really a serum test; it is a pig test. It is a matter of hunting around until we find pigs that are suitable to stand the test. It is not a true test; the test must come, necessarily, in the field. Personally I would not want to be worried with vaccinating hogs under field conditions as we do now, buying two thousand cubic centimeters of one serial and fifteen hundred of another; there is too much responsibility connected with it. Just for the satisfaction I have in keeping these records myself, I would rather buy it in larger quantities.

Now, in regard to production: I have heard serum producers state that they are making serum to suit themselves, and evidently they are. I think that all serum is more or less potent, and all virus more or less virulent. But there are different degrees of potency and virulence. I think the check on that really comes in the field, that a serum company can't produce serum, on a commercial basis alone, very long without getting into trouble.

Now, the handling of serum and virus in the field is another thing. I have been in veterinarians' offices where they leave the serum sitting around where it is warm. They take it out in the field, and bring it back, and then say they have one bottle that is no good. Some pigs die, and they blame it on that one bottle. If they understood the making of the mixture, they would know that that is simply impossible. It is their care of that particular bottle more than anything else. I keep serum and virus the year round in an ice-box. I keep a thermometer in it, watch it; it stays around forty or fifty degrees. In the field I carry them in an ice-box. I have checked it with a thermometer and carry it at around fifty degrees, and I think that is very important—with virus especially. There has not been enough experimental work done on this, but virus heated to atmospheric temperature in the summer time, and taken on trips half a dozen times before it is used, will be more or less weakened in its virulence, some of it becoming absolutely inert.

When I was in production work at the University of California, we had a man who came from Honolulu and bought some serum. He had to produce his own virus. He told me he couldn't keep virus alive two weeks, under the conditions which he had for producing it. The sanitary conditions entered into it. The virus that is contaminated and not produced in the cleanest manner, I think will weaken in a very short time. There are a good many factors like that which will have to be taken into consideration.

Pigs have enteritis, worms, isolated cases of pneumonia, and we have to take these things into consideration, or we will have trouble. As Dr. Benner said, we can overcome these by increasing the dose of serum, not in the sick pig alone, but in all the pigs in a herd, even to the well pigs, because they may have some of the lesions that we don't recognize from physical appearances.

I am inclined to agree with Dr. Benner, as regards the possible effect of serum on the hogs which you tested out. I have sent in some blood samples from hogs that I thought had distinct "breaks", and we were not able to reproduce the disease from those blood samples, and it might be that the virus would be affected from the serum that was given simultaneously, although the pig would sicken, I think, not due so much to the virus itself as to secondary conditions influenced by lowered vitality, the result of the reaction to the virus.

Now, one of the complications that we are having in the immunization of pigs in the field in Iowa is hog "flu". I confess I don't know anything about it. Still I have been bothered with it just the last two or three weeks. I had a very distinct outbreak of a disease in which the symptoms and history all pointed to typical hog cholera. The pigs would stand around with noses down and the curl out of their tails and refuse feed and die, show no symptoms of cough or thumps or diarrhea or any evidence of any other secondary condition. In another neighborhood they had this complicated condition of pigs sickening with thumps and cough. They all thumped and you would have said that it was typical hog "flu." What were we going to do? I have

been immunizing hogs against cholera under those conditions, even if they did show symptoms of "flu," by increasing the dose of serum one-half. My opinion is that if we have a good, potent serum we can overcome the effect of the virus by increasing the dose of the serum.

Now, I have kept a record on some four thousand hogs treated, all of which appeared to have "flu," without a loss of more than two per cent. A good many believe that can't be done. I used five cubic centimeters of virus on them. I like to use plenty of virus (these were heavy hogs), to make sure they get it. I have done that for three years. This last year we didn't have any cholera mixed with the "flu"; some got by without vaccinating. This year we are getting the "flu" and cholera all mixed up. The only thing I can advise is to go ahead and vaccinate, if there is any danger of cholera at all. (Applause.)

CHAIRMAN KINGMAN: Does anyone else wish to discuss this paper?

DR. BENNER: There is a little experience that I have had once or twice that I would like to ask others about; that is, in giving intra-axillary injections in pigs. Once in a great while I have one that dies rather quickly, in three or four to twelve hours.

I have suspected that the cause for this was rough handling. But I have also thought that it might be injury to some nerve in the axillary space. One was in a shoat of about fifty or sixty pounds. The owner had considerable trouble in catching him; I gave him the intra-axillary injection. When we turned him loose he was breathing hard, and was not able to get around very well. Before I left the place he was dead.

Another case that I had just last month was one where I vaccinated some shoats and there were two dead the next morning. I have vaccinated any number of hogs with the same serum and virus, and did not have any trouble at all.

I just wanted to ask whether anyone has had the same experience.

BUREAU VETERINARIANS TRANSFERRED

Dr. W. LeRoy Williamson (O. S. U. '15) of the meat inspection service at Chicago, has been transferred to the same line of work at Ottumwa, Iowa, Dr. Oliver T. Burton succeeding Dr. Williamson at Chicago, from a previous assignment at Ottumwa.

Dr. M. J. Kemen was transferred from hog cholera control work, in Mississippi, to meat inspection at Chicago, Illinois, effective July 23. Dr. Kemen has since severed his connection with the Bureau.

Dr. Lynn H. Mead (Corn. '14) has been transferred from meat inspection, at Madison, Wisconsin, to the same service at Chicago, Illinois. Dr. Daniel F. McCarthy (K. C. V. C. '18) has been transferred from a field position, in Arkansas, to meat inspection service at Chicago. Dr. Lenly T. Hopkins (Chi. '18) has been transferred from the meat inspection service, at Chicago, to the Meat Inspection Division at Washington.

Dr. John M. Young was transferred on August 16, from New York City to Brooklyn, N. Y., in the meat inspection service. Dr. Albert M. Meade has been transferred from tuberculosis eradication work, in Georgia, to a similar assignment in Nebraska.

EXCESSIVE PIG LOSSES CAN BE PREVENTED¹

By A. T. KINSLEY, Kansas City, Mo.

The live stock industry is the principal agricultural asset of the nations of North America. The success of live stock production by the American farmer must, at least in part, be attributed to the efficient control of diseases of animals. The annual toll of animal scourges has been diminished, but little has been accomplished in reducing infant mortality of farm animals. The loss of young animals in general, and pigs in particular, is enormous and it is evident that the future success of our animal industry is dependent upon lessening those losses.

Swine are produced on the majority of farms in America and represent one-tenth of the value of the agricultural products of the United States. Swine are the most economical farm animals for converting raw materials into meat food-products. The basic law of supply and demand ultimately regulates the production of necessary commodities and the constantly increasing population will result in an increased demand for pork products. Increased demands will necessitate a more intensive swine production and a tendency to overcrowding, conditions that favor an increased mortality, not only of infant pigs, but also of shoats and mature hogs. The principal losses of swine, numerically speaking, occur from the time of farrowing until the pigs are one month of age. The average breeder matures about fifty per cent of the pigs farrowed.

According to reports, there was over ten per cent more brood sows on farms in the United States in the spring of 1922 than 1921, but there was only an eight per cent increase in swine during that same period. The average number of pigs farrowed is nine plus. Sows should produce two litters each year. The average number of pigs saved per litter of the 1923 spring farrow was 5.02 according to a limited pig survey conducted by rural mail carriers for the United States Department of Agriculture. If extensive statistics were obtained, it is very probable that the average pig production per sow each year would be found to be less than nine.

Assuming that eight pigs is the average production per sow each year, then 7,500,000 sows are necessary to produce 60,000,000

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swine. If production efficiency were increased to eighty per cent the average production per sow each year would be fourteen pigs and it would require only 4,285,700 sows to produce 60,000,000 swine. That is, by increasing the production efficiency from fifty per cent to eighty per cent, the same number of pigs could be produced by sixty per cent of the sows that are now required. It would, therefore, be more economical to increase the production efficiency than to increase the number of brood sows.

The mortality of infant pigs is primarily due to improper swine management. This loss can be diminished by correcting the breeding methods, regulation of the feed, proper housing and providing sanitary quarters. It is true that the various factors conducive to infant-pig mortality are under the direct supervision of the swine producer. It is equally true that excessive losses of live stock, from disease or conditions that are preventable, are indicative of an incomplete veterinary service. The problems of swine management are numerous and only the most important factors will be considered.

SUGGESTIONS ON BREEDING AND FEEDING PROBLEMS

The boar is fifty per cent of the breeding herd. It is economical to use pure-bred boars for the breeding of market hogs. Boars should be kept separate, in a small pasture, during the summer months. The winter care should include proper housing with ample bedding and a maintenance ration. A common mistake of breeders is that of keeping the herd boar too fat. The boar should be given a maintenance ration during the non-breeding season. From two weeks to a month prior to the breeding season a ration of ground oats, barley, or mill-run feed, and skim milk or milk, should be provided. When possible, green foods should be supplemented, and in the big-type hogs it is advisable to supply extra quantities of minerals.

Gilts for breeding purposes should be selected from families that are good milkers and prolific. They should have ten or twelve well developed teats. Breeding gilts should be provided with a growing ration. They should not be fattened. For two months after breeding, the sow can be fed a ration containing a limited quantity of fat-forming elements, but they should be given a narrow ration during the last two months of gestation and the ration diminished from thirty to fifty per cent one week prior to farrowing. The sow should be provided with water but no food for one to two days after farrowing. The ration

should be limited until the pigs are about ten days of age after which it should be gradually increased, reaching the maximum when the pigs are about three weeks of age.

The proper age for mating swine is a question of considerable importance. From general observation it would appear that mature animals of about the same age generally produce the best results. It is said that there may be some difficulties, particularly in farrowing, when young sows are mated with aged boars. Aged sows may be bred to young boars, although some breeders contend that a mature boar produces stronger pigs and a larger litter. Another important question confronting the breeder is the length of time that sows or boars can be profitably kept for breeding purposes. According to the results of most breeders, it would appear that sows are profitable breeders for about five years, during which time they should produce two litters annually or ten litters in all. The length of time that a boar can be maintained as a profitable breeder will depend upon the proper selection of sows to avoid the disadvantages of intensive inbreeding. Boars that have been properly cared for and used are usually serviceable for at least five years.

Gilts should not be bred until they are practically mature. The large-type swine do not become mature until they are at least one year of age and these swine should not be bred until they are ten or eleven months of age. Smaller type swine mature at an earlier age and can be successfully bred when they are about six or seven months of age. The age at which a boar can be put into service varies according to breed. In large-type swine the boars should not do general service until they are one year of age and even at that age the service should be restricted. Boars of the smaller-type breeds can be put to limited service when they are six months of age.

PASTURE BREEDING UNDESIRABLE

One of the contributing factors in the production of small litters and excessive loss of recently farrowed pigs has been pasture breeding. It is not infrequent for a boar running with sows to make ten or fifteen services in a single day. A single service is sufficient for the breeding of healthy animals and if animals are not healthy they should not be used for breeding purposes.

Infection of the uterus of the sow is relatively common and is an important factor in the loss of pigs. The results of uterine

infection depend upon the virulence of the infection and the resistance of the sow. Infections with microbes of high virulence in a sow of low resistance may result in abortion but when some are infected with microbes of low virulence they will probably not abort, but will produce pigs of low vitality and possibly one or more runts. Pigs farrowed by sows with uterine infection are probably infected at the time of farrowing.

A small pen should be provided for the boar into which the sow can be driven for breeding purposes, unless a crate is available. When the boar has made one good service, the sow should be removed. It is true that individual-service breeding requires some time, but it will increase the pig production.

HOUSING

Proper shelter should be provided, for nature did not provide swine with a coat of hair or wool to protect them against extreme weather conditions. During March and April, 1923, several hundred thousand pigs died as a result of exposure, in the central states. Permanent hog-houses are not in favor with many of the leading swine producers because of the impossibility of efficient disinfection and the difficulty of rotation of lots. Temporary sheds and farrowing houses that can be moved from place to place are preferable. Damp, musty pens and houses, and improperly ventilated hog-houses favor the maintenance of various germs and are conducive to the life of animal parasites, thus further endangering the life of the recently farrowed pig.

The following is a brief summary of some of the conditions and diseases of pigs induced by improper management.

PYEMIC ARTHRITIS

Pyemic arthritis is a disease condition affecting recently farrowed pigs. This disease is characterized by inflammation of the umbilical tissue and suppurative arthritis. It is widespread and usually occurs as an enzootic. Pyemic arthritis is due to infection which may occur *in utero* or after farrowing. The disease is, in the majority of cases, manifest within ten days after farrowing. The symptoms consist of lameness, swollen, sensitive joints, diminished appetite and usually diarrhea. The young affected pigs usually have a diminished vitality and die within one or two days after the onset. The diagnosis can be verified by the post-mortem findings which consist of omphalitis, suppurative arthritis and there may be metastatic abscesses.

The treatment of pigs affected with pyemic arthritis is not satisfactory as a rule. This disease can be prevented by breeding healthy animals only, and by providing sanitary quarters.

PIG SCOUR

Scour in pigs is relatively common. Several million pigs die each year as a result of scour. Many swine breeders have lost ten to twenty-five per cent of their pig crop, for several successive years, from pig scour. This is essentially a disease of early life. Many theories have been advanced as to the cause of pig scour, and when all theories and evidence are carefully considered it appears that this condition in suckling pigs may be of dietary origin or infectious. The principal cause of scour in pigs, that are not infected *in utero*, is improper diet of the sow. No doubt, infection with various microbial agents, especially the representatives of the colon-typhoid group, is an important secondary cause of scour in pigs.

The principal symptom of pig scour consists of diarrhea. The discharges in the beginning are of a pasty consistency and of a gray or slate color. Later in the disease the discharges become watery and have a disagreeable odor. The tail and hind parts of the affected pig become soiled. The appetite is variable. Usually there are colicky pains and an appearance of dejection.

Medicinal treatment is of little avail because affected pigs have a low vitality. The disease can be prevented by breeding healthy sows and by proper feeding. Pregnant sows should be placed in individual farrowing lots or pens at least one week prior to farrowing and they should be given partial diet of ground oats, barley or mill feed. All feed should be withheld for at least twenty-four hours after farrowing and then a restricted diet provided, until ten days after farrowing, when the feed can be increased until a maximum production of milk is produced. By regulating the feed as above outlined, the mammary secretion is restricted and the pigs will not be gorged with excessive quantities of milk.

BULL-NOSE

Bull-nose (infectious rhinitis) is probably a specific infectious disease of pigs, characterized by inflammation of the mucous membrane of the nasal channel and related sinuses and by involvement and deformity of the facial bones. Bull-nose is rather prevalent and although not very fatal is responsible for the failure of development in affected individuals. Pigs that are

kept in filthy pens and improperly ventilated hog houses are predisposed to bull-nose. It is possible that the *B. pyocyaneus* is the specific cause of this condition. The symptoms manifested in bull-nose consist of sneezing and a watery discharge from the eyes and nose, which later becomes purulent. Affected swine have a tendency to root, and although they may eat heartily they do not gain in weight. In the latter stages there will be bulging of the facial bones. This lesion is usually associated with a peculiar blowing noise. Bull-nose can be readily and effectively prevented by providing sanitary quarters and by the proper selection of breeding animals.

SORE MOUTH

Sore mouth (stomatitis) is a very common condition in pigs and is responsible for the loss of a great many small pigs each year. This condition primarily occurs in swine in filthy pens or in those that are improperly housed and are not given the proper rations. It especially occurs in pigs of large litters, probably because of under-nourishment. Various microbial agents have been identified as possible causative factors of stomatitis. The *B. necrophorus* produces a distinct type of the disease ordinarily designated as necrotic stomatitis. The symptoms of stomatitis consist of depression, listlessness, the affected pigs have a tendency to remain quiet, and there may or may not be diarrhea. If the affected pigs are examined, lesions of various dimensions will be found in the mucous membrane of the mouth.

Stomatitis in pigs can be prevented by proper management of the breeding herd. This condition can be controlled by curetting the lesions of the mouth and applying some reliable antiseptic. When the disease has once made its appearance upon a farm, each pig should be carefully examined each day to determine whether or not any lesions exist and all affected pigs should be treated, as above described, daily.

GOITRE

There have been some losses of pigs due to goitre. These losses have occurred particularly in the northern section of the United States and Canada. The cause of goitre appears to be a deficiency of iodine or iodine salts in the food. The affected pigs show an enlargement in the throat region at the time of farrowing. In many instances, the affected pigs have no hair and are dead at the time of farrowing. This condition can be prevented

by administering iodine or iodine salts to sows during the period of gestation.

RICKETS

Rickets is essentially a disease of malnutrition. It is probably a condition resulting from the lack of vitamins, calcium salts or the absence of sunshine. It occurs in the development of the pigs and is manifested by digestive derangement, associated with disturbance of locomotion. Rickets frequently affects all the pigs in a litter and it may affect all the pigs on the same farm. Rickets is a preventable disease. The disease is rarely observed in herds that are properly housed and fed. This condition is usually quite effectively corrected by proper feeding and the administration of lime salts in conjunction with cod-liver oil.

ASCARIDOSIS

Pulmonary ascaridosis is another very important disease of little pigs. The loss incidental to the larval form of the ascarid occurs in pigs from ten to thirty days of age. Infestation of pigs over thirty days of age with the ascarid larvae rarely results fatally, although it will diminish the vitality of the infested pigs and they will not develop properly. Suffice it to say at this time that pulmonary ascaridosis is a disease that is easily controlled. The essential feature in controlling this condition consists of rotation of pasture and hog lots, thorough cleaning of brood sows and hog-houses, and the proper administration of efficient vermifuges to expel the adult ascarid. On farms in which the above is carried out the losses due to pulmonary ascarids have been reduced to a minimum.

SUMMARY

There will be a constantly increasing demand for pork products. An increased swine production can be accomplished most economically by diminishing infant mortality in pigs. The prevention of infant mortality of farm animals is one of the important problems, the solution of which depends upon the inauguration of twentieth-century farm hygiene and sanitation.

DISCUSSION

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DR. C. W. FOGLE: Dr. Kinsley made several references to oats, barley and mill feeds. I would like to call the attention of the gentlemen who are here, to the fact that alfalfa hay, either whole, chopped or ground, spread over many years, is a much more economical feed for swine than oats, barley or mill feed.

You men who are familiar with the yield of barley per acre know that it is an expensive crop to raise. This particular year wheat is worth about 80 or 90 cents a bushel, which makes ground whole wheat worth about \$1.50 per hundred, and mill feeds are worth around \$2.00 per hundred, retail, where the wheat is produced. Oats is always rather an expensive feed for hogs. Ground alfalfa hay to a very great extent takes the place of it, and the feeding value of a good quality of alfalfa is higher per one hundred pounds than a poor quality of oats, although the oats always sells at a higher price per ton than alfalfa.

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I don't think there is anything better that the profession can do today, for the live stock industry, than coach our clients in the protection of their pigs by giving them the clean life. Have them walking on the green; wherever they go, have something green under their feet—and of all the green things I believe alfalfa is the best. (Applause).

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PRACTICAL OBSERVATIONS ON CERTAIN DISEASES OF THE DOG AND OTHER LABORATORY ANIMALS¹

JOHN G. HARDENBERGH, V. M. D.

*Division of Experimental Surgery and Pathology,
Mayo Foundation, Rochester, Minnesota.*

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Some of the conditions under which our observations of disease have been made may differ in a few non-essential respects from those met with in general practice, but so far as the diseases themselves are concerned, they are, of course, identical. In private practice, each new case is a new problem requiring individual solution. Although every veterinarian has certain methods of treatment for certain conditions, yet, if he is to do justice to his client and to himself, he must make a separate study of each case and meet its own particular requirements. On the other hand, when several hundreds of animals are constantly in one's care, the problems of prevention, control and treatment of disease call for measures that are comparatively simple, efficient and routine in application, except in special instances. The observa-

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tions made as a result of these routine procedures, as we have practiced them, form the basis of this discussion and are of practical interest. Results of experimental work will be mentioned only so far as they have a direct bearing on the diseases discussed.

The chief consideration in preparing and holding animals for laboratory observation is, obviously, to maintain them in the best possible physical condition. In the case of dogs, this means giving them time and opportunity to contract distemper if they are not already immune, aiding recovery so far as possible, and then bringing them to good condition before they are turned over for laboratory use. We prefer to hold guinea pigs and rabbits, as well as dogs, for several weeks until they have become thoroughly acclimated; in the meantime any that are weak or have contracted disease during shipment will have recovered or died, and the laboratory is assured of a good supply of healthy animals accustomed to our methods of feeding and confinement. Such a system necessitates the keeping of a surplus of animals of all kinds, but it is the best and most economical system in the long run; it is much better to take losses in laboratory animals before they have been used rather than to have an experiment or a series of experiments come to naught because of the untimely death of animals at what is often a critical stage in the work, all because of improper preparation of the subjects. In addition, clean quarters, proper diet and exercise are important factors.

DISEASES OF DOGS

Distemper.—Distemper, as we see it, is about equally prevalent at all times of the year. I know of nothing new as to the primary cause; neither has a "cure" been found. It seems to have no great respect for age, because it occurs in dogs of practically all ages. I wish to emphasize that non-immune dogs contract the disease, regardless of age, either shortly after being exposed, or following etherization and surgical interference. It seems plausible that the reason distemper is not more often observed in old, non-immune dogs is because there is seldom a sufficient decrease of natural resistance or reduced vitality after such animals have reached maturity, associated with exposure to a virulent infection. Most of our dogs are city raised, and about 50 per cent are already immune.

It is believed that *Bacterium bronchisepticum* is not the real primary cause of distemper, and there is considerable data to

support this view. We have failed to produce distemper at all consistently in young susceptible animals by repeated doses of this organism given intranasally, intratracheally, intravenously or subcutaneously, and in various combinations of these methods. Yet we have seen these same animals develop typical cases several weeks or months later, when exposed to natural infection. In trying to cause canine distemper by use of *Bacterium bronchisepticum*, we have used not only cultures freshly isolated in our laboratory, but also several strains furnished by the laboratory where this organism was first isolated and described. The organism is found in almost every case of distemper that is cultured, and frequently is isolated in pure culture from the trachea and large bronchi. However, its etiologic as well as immunologic significance have not been apparent.

The respiratory or catarrhal form of the disease is most common; it is usually accompanied by involvement of the eyes, and often by intestinal disturbance. This form almost invariably terminates in bronchopneumonia. In younger animals the pustular manifestations on the abdomen and inner thighs is often observed, but this form is seldom uncomplicated by more serious lesions.

It would seem superfluous to discuss the symptoms of distemper, because every practitioner is familiar with them.

Our method of treatment is as follows: As soon as an animal is found to be diseased, he is removed from the open pens where he has been running with a few other dogs, and placed in a cage where there is ample opportunity to eat, if he will, without interference. The diet consists of kibbled dog biscuit, bread, with whole or skimmed milk, meat occasionally, and plenty of water. The only drugs consistently used are combinations of eucalyptus, camphor, guaiacol, and others which are eliminated to some extent through the lungs. Such medication does not, I believe, reduce the mortality, but it does seem to hasten resolution and facilitate recovery in those animals that are "predestined" to survive. We have always tried to approach the various phases of distemper with an open mind, and consequently have tried almost everything that has been reliably sponsored as exerting a favorable action in the disease. As a result our medical régime has been reduced to that just outlined.

We have given every form of biologic treatment extensive and repeated trials without reducing mortality. These trials have been made with commercial products gratuitously supplied by the manufacturers, or purchased in the open market, or with

products which we have prepared ourselves. Both the commercial and domestic preparations have included bacterins and anti-sera prepared with *Bacterium bronchisepticum* alone, and also products that were polyvalent. There have been times when, if we had been contented to limit the trial of these biologic preparations to a few animals, we would have been left with the impression that we were getting good results; however, when the trials were extended to cover hundreds of animals, in one instance five hundred being used, we were forced to conclude that no appreciable good had been done.

Our records show a mortality from distemper of 28 per cent. This is probably a fairly low rate considering the type of disease most prevalent in our animals and the rather simple method of treatment, compared with that usually employed in private practice. One factor which may help to account for the low rate is the type of dog we receive. Many of them are true mongrels, and such animals are not to be surpassed in natural resistance, "toughness," and allround, never-say-die spirit. In my experience in treating pure-bred dogs, the mortality has averaged close to 75 per cent. Such animals die when least expected, and with the least evidence of resistance. These highly bred animals, with hypersensitive nervous mechanisms, are also prone to develop lesions of the nervous system, which detract greatly from the chances for recovery.

Because of the type of dog which predominates in our kennels, sequelae are not very common. We occasionally see chorea, more accurately "tic" or clonic spasms, as a sequela of distemper, and have found it impossible to cure. Whether or not this condition is a true chorea is beside the question. Certainly nine-tenths of the cases designated chorea are sequelae of distemper. The frequency of chorea in police dogs is evident from our own observations, from the experience of other men who have had considerable canine practice, and from demonstrations we have seen at small animal clinics. In some instances there is a history of distemper, and in others the owners felt quite certain that the disease had never been present. The keepers of the kennels from which the animals were first obtained also denied the previous occurrence of distemper in these cases, but this is to be expected. Nevertheless, from the fact that animals without a history of distemper failed to contract the disease later, when exposed to it, we have concluded that there had been a previous attack, either so light as to be unrecognized, or simply denied.

Of the other sequelae, eye lesions are most common. Some very obstinate cases of conjunctivitis and keratitis appear with, or follow, distemper. Deafness is occasionally noted and chronic nasal discharges are common.

External parasites.—Fleas, lice, and sarcoptic mange are the usual forms of external parasitism with which we have to deal. An occasional case of demodectic mange is seen.

Owing to our routine of handling newly received animals, and the sanitary construction of our kennels, we have little difficulty with fleas and lice. New dogs are dipped when received in a 1 per cent solution of a cresol-phenol compound, and this usually suffices to eliminate the blood sucking parasites. Thereafter, a flea- or louse-infested animal in the kennels is rarely found. Sarcoptic mange is also well controlled by the routine practise of dipping new animals. On the day after being given the dip for fleas and lice, all new dogs receive the first of three treatments with lime and sulphur solution. Two more treatments are given at intervals of a week, and this serves to keep our cases of sarcoptic mange at a low level. Treatments are given by the tank method, the animals being placed in a metal crate which holds two to four dogs, depending on their size; this crate is lowered several times into a tank of the lime and sulphur solution, the animals being completely immersed for a second, and then raised. There are a few obstinate cases always present to act as sources of infection, and also a few new cases continually being shipped in. Any cases appearing in the kennels are treated by the method described; if any small areas of infestation remain after a course of dipping and are slow in healing, such spots are painted with a mixture of sulphur and oil. Out of several hundred dogs constantly under observation, there are seldom more than ten or fifteen under treatment for scabies at one time.

The lime and sulphur solution which we use is a concentrated preparation manufactured by a chemical company, and tests between 32° and 33° Baume. For use, it is diluted with six parts of water, and we have found it very convenient and economical.

Mange caused by the *Demodex folliculorum* is uncommon. For reasons which everyone who has had much experience with this disease will understand, we find it most efficient to use an animal thus affected in an acute experiment, rather than to subject it to a tedious course of treatment, which at best is uncertain in results. Formalin is recommended by some, but the discomfort

to the patient is intense. We have recently started a test of the treatment recommended and demonstrated by Marsteller, at the meeting of this society last year, but are not yet prepared to give our opinion of the method.

Internal parasites.—It is our observation that ordinary degrees of infestation with the common round worms and tapeworms in mature dogs are generally of little importance. We recognize the seriousness of intestinal parasites in young growing animals. In the majority of our dogs that come to necropsy, varying degrees of ascariasis and taeniasis are evident, but it often happens that heavily infested animals are in excellent condition; many even fail to show local intestinal irritation. For this reason no routine attempt is made to rid the dogs of intestinal parasites. In our experience, however, oil of chenopodium has proved most effective for round worms.

From the standpoint of actual damage to the host, it appears that hookworm infestation is the most serious; certainly there is more evidence of injury to dogs from hookworm than from any other intestinal parasite. Carbon tetrachloride is, of course, the drug par excellence for treatment.

For tapeworms, we can endorse the use of arecoline hydrobromide, as recommended by Lentz, except that we would suggest slightly larger doses. We have used this drug in a few cases of privately owned dogs with more satisfaction to the owner and ourselves than any other drug. The promptness with which the taenia are expelled is striking.

Diseases of the eye.—The most common disorders of the eye are catarrhal and purulent conjunctivitis, and parenchymatous and ulcerative keratitis. They all seem to be closely related, as any of the milder forms of conjunctivitis are capable of developing into the more severe forms of keratitis. The etiology of these diseases is not entirely clear, but they may follow distemper, local irritation and injuries, and in some instances are certainly due to specific infection. Certain observers have demonstrated ophthalmia as a result of faulty diet, an apparent lack of the fat-soluble vitamin.

We have isolated from cases of ulcerative keratitis a long-chained streptococcus in pure culture. Control cultures from the conjunctival sac of healthy eyes are always negative, if due care is taken to avoid contamination of the swab used in culturing. Treatment for all forms of conjunctivitis and keratitis is routine. The conjunctival sac is washed out with a 1 to 1000 solution of

bichloride, followed by the application of yellow oxide of mercury ointment. A 1 to 1000 solution of bichloride in olive oil is to be recommended also. We believe that there need be no hesitation in using bichloride in what appears to be a strong solution for eye work; at least no untoward results from its use have been observed, and results appear more speedily than with the milder antiseptics.

Ulcerative and gangrenous stomatitis.—The incidence of these conditions is very irregular. Most of our cases have been seen in the winter months and occur in poorly nourished animals, those having extensive caries of the teeth, and so forth. Only one case has been observed in the last six months.

Textbooks mention the presence of *Actinomyces necrophorus*, *Bacterium septicum*, and *Bacterium coli* in the affected tissues. It is conceivable that almost any organism might be found in such lesions of the mouth without etiologic significance. We have been interested to observe the presence of *Bacillus fusiformis*, and spirillae as found in cases of Vincent's angina in man, an ulcerative condition of the tonsils, and also in cases of pulmonary gangrene. These two microbial forms are always associated, and it is thought that the spirillae result from longitudinal division of the *Bacillus fusiformis*. Some authors regard *Bacillus fusiformis* as the cause of Vincent's angina, and there is no reason why it should not have a similar rôle in ulcerative and gangrenous stomatitis of animals. In support of this view, Kline has recently reported the production of gangrene experimentally. He used material from cases of dental caries, of Vincent's angina, and of pulmonary gangrene, all containing spirillae and *Bacillus fusiformis*, and was able, in the presence of dead tissue, to cause gangrene in guinea pigs. He also produced pulmonary gangrene in a rabbit with similar material.

If animals with ulcerative and gangrenous stomatitis have diseased teeth, the latter are extracted, and the diseased tissues completely extirpated; this is followed by daily irrigation with Dakin's solution.

Deficiency diseases.—Osteomalacia will be the only disease of this type discussed. We reported a similar condition, designated "kennel lameness," some time ago, and have come to regard it as a type of osteomalacia peculiar to the particular conditions under which animals are held. It presents marked softening of the ribs, pelvis and some vertebrae, with resultant deformities of these structures and a typical stiffness in gait. It occurs in only

by administering iodine or iodine salts to sows during the period of gestation.

RICKETS

Rickets is essentially a disease of malnutrition. It is probably a condition resulting from the lack of vitamins, calcium salts or the absence of sunshine. It occurs in the development of the pigs and is manifested by digestive derangement, associated with disturbance of locomotion. Rickets frequently affects all the pigs in a litter and it may affect all the pigs on the same farm. Rickets is a preventable disease. The disease is rarely observed in herds that are properly housed and fed. This condition is usually quite effectively corrected by proper feeding and the administration of lime salts in conjunction with cod-liver oil.

ASCARIDOSIS

Pulmonary ascaridosis is another very important disease of little pigs. The loss incidental to the larval form of the ascarid occurs in pigs from ten to thirty days of age. Infestation of pigs over thirty days of age with the ascarid larvae rarely results fatally, although it will diminish the vitality of the infested pigs and they will not develop properly. Suffice it to say at this time that pulmonary ascaridosis is a disease that is easily controlled. The essential feature in controlling this condition consists of rotation of pasture and hog lots, thorough cleaning of brood sows and hog-houses, and the proper administration of efficient vermifuges to expel the adult ascarid. On farms in which the above is carried out the losses due to pulmonary ascarids have been reduced to a minimum.

SUMMARY

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¹Presented before the sixtieth annual meeting of the American Veterinary Medical Association, Montreal, Canada, August 27-31, 1923.

tions made as a result of these routine procedures, as we have practiced them, form the basis of this discussion and are of practical interest. Results of experimental work will be mentioned only so far as they have a direct bearing on the diseases discussed.

The chief consideration in preparing and holding animals for laboratory observation is, obviously, to maintain them in the best possible physical condition. In the case of dogs, this means giving them time and opportunity to contract distemper if they are not already immune, aiding recovery so far as possible, and then bringing them to good condition before they are turned over for laboratory use. We prefer to hold guinea pigs and rabbits, as well as dogs, for several weeks until they have become thoroughly acclimated; in the meantime any that are weak or have contracted disease during shipment will have recovered or died, and the laboratory is assured of a good supply of healthy animals accustomed to our methods of feeding and confinement. Such a system necessitates the keeping of a surplus of animals of all kinds, but it is the best and most economical system in the long run; it is much better to take losses in laboratory animals before they have been used rather than to have an experiment or a series of experiments come to naught because of the untimely death of animals at what is often a critical stage in the work, all because of improper preparation of the subjects. In addition, clean quarters, proper diet and exercise are important factors.

DISEASES OF DOGS

Distemper.—Distemper, as we see it, is about equally prevalent at all times of the year. I know of nothing new as to the primary cause; neither has a "cure" been found. It seems to have no great respect for age, because it occurs in dogs of practically all ages. I wish to emphasize that non-immune dogs contract the disease, regardless of age, either shortly after being exposed, or following etherization and surgical interference. It seems plausible that the reason distemper is not more often observed in old, non-immune dogs is because there is seldom a sufficient decrease of natural resistance or reduced vitality after such animals have reached maturity, associated with exposure to a virulent infection. Most of our dogs are city raised, and about 50 per cent are already immune.

It is believed that *Bacterium bronchisepticum* is not the real primary cause of distemper, and there is considerable data to

support this view. We have failed to produce distemper at all consistently in young susceptible animals by repeated doses of this organism given intranasally, intratracheally, intravenously or subcutaneously, and in various combinations of these methods. Yet we have seen these same animals develop typical cases several weeks or months later, when exposed to natural infection. In trying to cause canine distemper by use of *Bacterium bronchisepticum*, we have used not only cultures freshly isolated in our laboratory, but also several strains furnished by the laboratory where this organism was first isolated and described. The organism is found in almost every case of distemper that is cultured, and frequently is isolated in pure culture from the trachea and large bronchi. However, its etiologic as well as immunologic significance have not been apparent.

The respiratory or catarrhal form of the disease is most common; it is usually accompanied by involvement of the eyes, and often by intestinal disturbance. This form almost invariably terminates in bronchopneumonia. In younger animals the pustular manifestations on the abdomen and inner thighs is often observed, but this form is seldom uncomplicated by more serious lesions.

It would seem superfluous to discuss the symptoms of distemper, because every practitioner is familiar with them.

Our method of treatment is as follows: As soon as an animal is found to be diseased, he is removed from the open pens where he has been running with a few other dogs, and placed in a cage where there is ample opportunity to eat, if he will, without interference. The diet consists of kibbled dog biscuit, bread, with whole or skimmed milk, meat occasionally, and plenty of water. The only drugs consistently used are combinations of eucalyptus, camphor, guaiacol, and others which are eliminated to some extent through the lungs. Such medication does not, I believe, reduce the mortality, but it does seem to hasten resolution and facilitate recovery in those animals that are "predestined" to survive. We have always tried to approach the various phases of distemper with an open mind, and consequently have tried almost everything that has been reliably sponsored as exerting a favorable action in the disease. As a result our medical régime has been reduced to that just outlined.

We have given every form of biologic treatment extensive and repeated trials without reducing mortality. These trials have been made with commercial products gratuitously supplied by the manufacturers, or purchased in the open market, or with

products which we have prepared ourselves. Both the commercial and domestic preparations have included bacterins and anti-sera prepared with *Bacterium bronchisepticum* alone, and also products that were polyvalent. There have been times when, if we had been contented to limit the trial of these biologic preparations to a few animals, we would have been left with the impression that we were getting good results; however, when the trials were extended to cover hundreds of animals, in one instance five hundred being used, we were forced to conclude that no appreciable good had been done.

Our records show a mortality from distemper of 28 per cent. This is probably a fairly low rate considering the type of disease most prevalent in our animals and the rather simple method of treatment, compared with that usually employed in private practice. One factor which may help to account for the low rate is the type of dog we receive. Many of them are true mongrels, and such animals are not to be surpassed in natural resistance, "toughness," and all round, never-say-die spirit. In my experience in treating pure-bred dogs, the mortality has averaged close to 75 per cent. Such animals die when least expected, and with the least evidence of resistance. These highly bred animals, with hypersensitive nervous mechanisms, are also prone to develop lesions of the nervous system, which detract greatly from the chances for recovery.

Because of the type of dog which predominates in our kennels, sequelae are not very common. We occasionally see chorea, more accurately "tic" or clonic spasms, as a sequela of distemper, and have found it impossible to cure. Whether or not this condition is a true chorea is beside the question. Certainly nine-tenths of the cases designated chorea are sequelae of distemper. The frequency of chorea in police dogs is evident from our own observations, from the experience of other men who have had considerable canine practice, and from demonstrations we have seen at small animal clinics. In some instances there is a history of distemper, and in others the owners felt quite certain that the disease had never been present. The keepers of the kennels from which the animals were first obtained also denied the previous occurrence of distemper in these cases, but this is to be expected. Nevertheless, from the fact that animals without a history of distemper failed to contract the disease later, when exposed to it, we have concluded that there had been a previous attack, either so light as to be unrecognized, or simply denied.

Of the other sequelae, eye lesions are most common. Some very obstinate cases of conjunctivitis and keratitis appear with, or follow, distemper. Deafness is occasionally noted and chronic nasal discharges are common.

External parasites.—Fleas, lice, and sarcoptic mange are the usual forms of external parasitism with which we have to deal. An occasional case of demodectic mange is seen.

Owing to our routine of handling newly received animals, and the sanitary construction of our kennels, we have little difficulty with fleas and lice. New dogs are dipped when received in a 1 per cent solution of a cresol-phenol compound, and this usually suffices to eliminate the blood sucking parasites. Thereafter, a flea- or louse-infested animal in the kennels is rarely found. Sarcoptic mange is also well controlled by the routine practise of dipping new animals. On the day after being given the dip for fleas and lice, all new dogs receive the first of three treatments with lime and sulphur solution. Two more treatments are given at intervals of a week, and this serves to keep our cases of sarcoptic mange at a low level. Treatments are given by the tank method, the animals being placed in a metal crate which holds two to four dogs, depending on their size; this crate is lowered several times into a tank of the lime and sulphur solution, the animals being completely immersed for a second, and then raised. There are a few obstinate cases always present to act as sources of infection, and also a few new cases continually being shipped in. Any cases appearing in the kennels are treated by the method described; if any small areas of infestation remain after a course of dipping and are slow in healing, such spots are painted with a mixture of sulphur and oil. Out of several hundred dogs constantly under observation, there are seldom more than ten or fifteen under treatment for scabies at one time.

The lime and sulphur solution which we use is a concentrated preparation manufactured by a chemical company, and tests between 32° and 33° Baume. For use, it is diluted with six parts of water, and we have found it very convenient and economical.

Mange caused by the *Demodex folliculorum* is uncommon. For reasons which everyone who has had much experience with this disease will understand, we find it most efficient to use an animal thus affected in an acute experiment, rather than to subject it to a tedious course of treatment, which at best is uncertain in results. Formalin is recommended by some, but the discomfort

to the patient is intense. We have recently started a test of the treatment recommended and demonstrated by Marsteller, at the meeting of this society last year, but are not yet prepared to give our opinion of the method.

Internal parasites.—It is our observation that ordinary degrees of infestation with the common round worms and tapeworms in mature dogs are generally of little importance. We recognize the seriousness of intestinal parasites in young growing animals. In the majority of our dogs that come to necropsy, varying degrees of ascariasis and taeniasis are evident, but it often happens that heavily infested animals are in excellent condition; many even fail to show local intestinal irritation. For this reason no routine attempt is made to rid the dogs of intestinal parasites. In our experience, however, oil of chenopodium has proved most effective for round worms.

From the standpoint of actual damage to the host, it appears that hookworm infestation is the most serious; certainly there is more evidence of injury to dogs from hookworm than from any other intestinal parasite. Carbon tetrachloride is, of course, the drug par excellence for treatment.

For tapeworms, we can endorse the use of arecoline hydrobromide, as recommended by Lentz, except that we would suggest slightly larger doses. We have used this drug in a few cases of privately owned dogs with more satisfaction to the owner and ourselves than any other drug. The promptness with which the taenia are expelled is striking.

Diseases of the eye.—The most common disorders of the eye are catarrhal and purulent conjunctivitis, and parenchymatous and ulcerative keratitis. They all seem to be closely related, as any of the milder forms of conjunctivitis are capable of developing into the more severe forms of keratitis. The etiology of these diseases is not entirely clear, but they may follow distemper, local irritation and injuries, and in some instances are certainly due to specific infection. Certain observers have demonstrated ophthalmia as a result of faulty diet, an apparent lack of the fat-soluble vitamin.

• We have isolated from cases of ulcerative keratitis a long-chained streptococcus in pure culture. Control cultures from the conjunctival sac of healthy eyes are always negative, if due care is taken to avoid contamination of the swab used in culturing. Treatment for all forms of conjunctivitis and keratitis is routine. The conjunctival sac is washed out with a 1 to 1000 solution of

bichloride, followed by the application of yellow oxide of mercury ointment. A 1 to 1000 solution of bichloride in olive oil is to be recommended also. We believe that there need be no hesitation in using bichloride in what appears to be a strong solution for eye work; at least no untoward results from its use have been observed, and results appear more speedily than with the milder antiseptics.

Ulcerative and gangrenous stomatitis.—The incidence of these conditions is very irregular. Most of our cases have been seen in the winter months and occur in poorly nourished animals, those having extensive caries of the teeth, and so forth. Only one case has been observed in the last six months.

Textbooks mention the presence of *Actinomyces necrophorus*, *Bacterium septicum*, and *Bacterium coli* in the affected tissues. It is conceivable that almost any organism might be found in such lesions of the mouth without etiologic significance. We have been interested to observe the presence of *Bacillus fusiformis*, and spirillae as found in cases of Vincent's angina in man, an ulcerative condition of the tonsils, and also in cases of pulmonary gangrene. These two microbial forms are always associated, and it is thought that the spirillae result from longitudinal division of the *Bacillus fusiformis*. Some authors regard *Bacillus fusiformis* as the cause of Vincent's angina, and there is no reason why it should not have a similar rôle in ulcerative and gangrenous stomatitis of animals. In support of this view, Kline has recently reported the production of gangrene experimentally. He used material from cases of dental caries, of Vincent's angina, and of pulmonary gangrene, all containing spirillae and *Bacillus fusiformis*, and was able, in the presence of dead tissue, to cause gangrene in guinea pigs. He also produced pulmonary gangrene in a rabbit with similar material.

If animals with ulcerative and gangrenous stomatitis have diseased teeth, the latter are extracted, and the diseased tissues completely extirpated; this is followed by daily irrigation with Dakin's solution.

Deficiency diseases.—Osteomalacia will be the only disease of this type discussed. We reported a similar condition, designated "kennel lameness," some time ago, and have come to regard it as a type of osteomalacia peculiar to the particular conditions under which animals are held. It presents marked softening of the ribs, pelvis and some vertebrae, with resultant deformities of these structures and a typical stiffness in gait. It occurs in only

a few animals and is a result of faulty metabolism, rather than any general lack of food factors. If the latter condition prevailed, much more of the disease would be seen. It can be prevented by increasing the mineral intake of the animal, feeding liberal quantities of meat, by the administration of cod liver oil and calcium phosphate, and by increasing the exercise taken by the animal.

Renal calculi.—Renal calculi in the dog are generally regarded as rare; Hutyra and Marek place the incidence at 0.3 per cent. In our series of 433 consecutive animals, examined postmortem between December, 1921 and October 1, 1922, we found fifty with varying degrees of stone formation in one or both kidneys, an incidence of 11 per cent. It is possible that further examinations will lower this percentage, and examinations are to be conducted to determine this point.

Rabies.—It is a matter of interest that, in a period of more than two years during which nearly four thousand dogs were received, only one case of rabies occurred. The diagnosis was checked by laboratory methods.

Infectious sarcoma or infectious venereal granulomas.—This condition which used to be seen mostly in highly bred dogs of certain breeds has become quite general, and is now seen in many types of dogs. An animal was recently examined in which the primary lesion was in the vagina and the condition had metastasized to the liver and spleen.

Anatomical anomalies.—Various anatomical anomalies are seen, both antemortem and postmortem. The more interesting include a case of congenital diaphragmatic hernia and two cases of pseudo-hermaphroditism.

DISEASES OF RABBITS

Rabbits are subject to a greater variety of diseases than other small laboratory animals, with the exception of cats. Snuffles and coccidiosis cause many deaths. Ear mange, diarrhea and other intestinal disturbances are less fatal but quite common in occurrence.

Snuffles.—Snuffles takes its name from the snuffling breathing of rabbits having the disease; it is very infectious, is favored by exposure, and damp, insanitary surroundings and is attended by a high mortality. There is sneezing, a watery discharge from the nose, which later becomes purulent, followed by weakness and general prostration. Little can be done in treating the con-

dition, but efforts should be made to control the spread of the infection. This is best accomplished by disposing of all sick animals and burying them deeply or incinerating; pens and runs must be thoroughly cleaned and disinfected and made sanitary.

Coccidiosis.—Coccidiosis in rabbits is caused by *Coccidium cuniculi*, an animal parasite. It is fatal to young rabbits; old rabbits have abscesses in the liver, sometimes without apparent harm. The parasites are expelled with the droppings of diseased animals, which facilitates the spread of the disease. It is claimed that the parasites must live outside the host for five days in order to be infective for others; this cycle of development makes it possible to control the spread of infection by thorough cleaning and disinfection of pens and runs every five days. Besides hygienic measures, treatment is of little value.

Ear mange.—This condition is exceedingly common in rabbits. It is caused by the psoroptic mite and is easily recognized by the formation of brownish crusts within the ear. The infestation usually appears first deep within the ear, and gradually extends over the entire inner surface; thick, foul-smelling crusts and discharges finally fill the entire cavity in severe cases, and there may be involvement of the meninges which results in death. Rabbits with ear mange first show irritation of the organ by violent scratching of the ears and shaking of the head; the affected ear or ears begin to droop, and finally become entirely dependent on account of the weight of the material contained within them; if only one side is affected, the head is turned to one side.

This condition can be treated very satisfactorily, and the treatment is worth while, especially in valuable breeding animals. The ears should be thoroughly cleaned of all discharge, the crusts being softened with soap and water and entirely removed without injuring the ear. The material removed should be carefully disposed of, as it is usually teeming with the parasites. After thorough cleansing, the ears should be thoroughly covered inside and out with sulphur ointment; concentrated lime and sulphur may be poured into the ear and the excess drained out, or the ears may be dusted thoroughly with powdered sulphur. Several treatments at intervals of a few days or a week may be necessary in advanced cases; lighter cases will respond to two or three treatments. Thoroughness is essential. There is little likelihood of mistaking the condition, but diagnosis can be con-

firmed by examination of some of the discharge under the microscope.

Mange affecting the skin over the body is not seen to any extent in animals kept in clean quarters. The treatment is with sulphur ointments, lime and sulphur solution and so forth.

Diarrhea.—Diarrhea of rabbits may be caused by sudden changes in food, particularly changes in green food, by over-feeding of green stuff, and food that is not in good condition. The diarrhea is best treated by withdrawing all green food temporarily and placing the animal on a diet of grains, clean bright hay (alfalfa, clover or timothy) and pure drinking water. Judicious feeding of rabbits will prevent most of the intestinal disturbances to which rabbits are subject.

DISEASES OF GUINEA PIGS

The most fatal and common disease of guinea pigs is pneumonia, which is prevalent especially in the late winter and early spring months. It results from exposure to draughts and cold, confinement in damp cages, marked fluctuations in temperature, and probably a specific infection. Treatment is impractical, but a degree of prevention is possible. Guinea pigs absolutely will not survive in draughty quarters, nor will they tolerate marked fluctuations in temperature over short periods of time; extreme cold is also fatal.

Lice are very common on guinea pigs, but clean quarters keep this condition suppressed.

DISEASES OF WHITE RATS AND WHITE MICE

As in guinea pigs, pneumonia is responsible for the greatest losses among these animals. The same principles of prevention apply, as treatment is obviously impractical. White rats are sometimes affected with ear mange which can be treated the same as in rabbits.

The chief factors in handling all the smaller laboratory animals are, first of all, clean, dry quarters that are not subject to marked variations in temperature; second, a suitable diet, and for guinea pigs and rabbits especially, this must include some kind of green food the year round, such as sowed corn, alfalfa and clover in the summer, and carrots, beets, cabbage and so forth, in the winter. Even a very small allowance of such food in the winter will do much to make the animals thrive, and reduce losses from deaths without apparent cause. An adequate supply of roughage

in the form of clean hay should be available to rabbits and guinea pigs at all times. Clean drinking water is essential to rabbits, but guinea pigs do not require it if they are supplied constantly with green food or roots.

BIBLIOGRAPHY

¹Brimhall, S. D., and Hardenbergh, J. G.: A study of so-called kennel lameness—Preliminary report. *Jour. Amer. Vet. Med. Assn.*, 1922, lxi, 145-154.

²Hutyra, F., and Marek, J.: Special pathology and therapeutics of the diseases of domestic animals. Chicago, A. Eger, 1916, p. 1100.

³Kline, B. S.: Experimental gangrene. *Jour. Infect. Dis.*, 1923, xxxii, 481-483.

A RARE CASE OF TUBERCULOSIS

There was recently forwarded to the Bureau of Animal Industry Laboratories, in Washington, a specimen of muscle tissue from a bull which had been shipped in for slaughter in a lot of 34 other bulls. A number of this lot were found to be badly infected with tuberculosis. The specimen was apparently a tumorous growth attached to the musculature and was, upon examination, found to contain organisms of an acid-fast type, having the size and form of bovine tubercle bacilli. The report of the Pathological Division stated, "This appearance of tuberculosis lesion is known as the proliferative form of tuberculosis, and seldom occurs except in very advanced cases." In this case, however, the lesions were not of the progressive type except that the muscle lesions reported were quite numerous, well marked, and were found on both hind quarters in the crural and gluteal muscles.

ANOTHER VETERINARY EXHIBIT

Dr. C. M. Christy, of Brookville, Pa., arranged a booth at the recent Forest County (Pa.) Fair, showing lesions of tuberculosis, photographs of reactions, etc., and in addition, had original placards giving data of local interest, and pamphlets furnished by the Federal Bureau of Animal Industry, describing the disease and its economic importance. This booth attracted about as much attention as any booth at the Fair and stimulated interest in the eradication of this disease. It has been found in that county that 62% of the tuberculosis among cattle can be traced to one herd. This exhibit shows what an enterprising local veterinarian can do to interest the general public in animal diseases.

DIAGNOSTIC SYMPTOMS AND DIFFERENTIAL TREATMENT OF VARIOUS FORMS OF COLIC IN THE HORSE¹

By G. H. MYDLAND, Horton, Kan.

The term colic is one which is very widely used by both laity and veterinarian in referring to innumerable and widely differing diseases of the horse, characterized by pain originating from the abdominal region. The term used in its most restricted sense should include only such affections as are manifested by pain originating from the digestive tract. Various writers have therefore classified colics as true and false. True colics are those as are mentioned above, in which pain originates from the digestive tract (stomach and intestines). False colics are those in which pain originates from a diseased state of any of the other abdominal organs, such as disorders of the urinary, reproductive and hepatic organs.

It will not be the purpose of this brief paper to try to take into consideration all of the various affections which might be included under the above two classifications but will limit it to a discussion of the symptoms and treatment of some of the more or less acute affections classed as true colics, most often encountered by the average practitioner. Neither will it be the purpose to offer anything new, but rather to review the symptoms and suggest such treatment as will be of practicable every-day use to the practitioner.

From the standpoint of practice, true colics may be classified as follows:

1. Acute dilatation of the stomach.
2. Simple impaction of the intestines.
3. Colic due to displacement of the bowel.
4. Flatulent colic.
5. Spasmodic colic.
6. Embolic colic.

ACUTE DILATATION OF THE STOMACH

This is a quite common affection of horses and is usually due to irrational or over-feeding. Later, fermentation of the ingesta takes place, causing a severe dilatation of the organ. History

¹Read before the annual meeting of the Missouri Valley Veterinary Association, Omaha, Nebr., July 23, 1923.

will disclose that the horse has usually had an overfeed of grain, or that the attack occurred shortly after feeding, following a hard day's work. However, sometimes attacks occur as long as seven or eight hours after feeding.

Characteristic symptoms are fullness of the abdomen and dyspneic breathing. The dilatation of the stomach interferes with the free action of the diaphragm. The pains are usually rather mild at the onset, becoming more severe the longer the attack lasts. However the pains rarely become very severe. The animal in the standing position will stand with lowered head, often leaning against the stall or wall. When lying down will either lie on its side or assume a sitting-dog position, to relieve the pressure from the diaphragm. Eructations of the esophagus take place in quite a number of cases and this is of great diagnostic value, when present. Vomiting is another symptom often noticed in this condition, but one must not always associate this act with rupture of the stomach, because vomiting can often occur without a ruptured stomach.

The most valuable treatment for this condition is the use of the stomach tube. This treatment should be tried for all cases of dilatation of the stomach and in the majority of cases the contents of the stomach can be liquified sufficiently with water so that they may be siphoned out of the tube. In a few cases one will encounter considerable difficulty in doing this, for it appears as though the walls have lost their contractile powers, causing no pressure on the ingesta. In this connection, I wish to say that I have completely discarded the use of the double tube in my own practice. The single tube is the only one which I have found to be practical.

It is often important that not all of the contents of the stomach be emptied out through the tube, at least too suddenly, as it will sometimes cause shock. It is advisable to leave about one or two gallons of water in the stomach, to which has been added some antiferment, such as eucamphine. In cases in which the stomach tube is not used, Dr. Quitman advises the administration of one-half ounce of salicylic acid in capsule. This treatment gives very good results in some cases.

SIMPLE IMPACTION OF THE INTESTINES

This form of colic constitutes the most common form encountered in the horse. Two forms may be recognized: (1) impaction of the small bowels and (2) impaction of the large bowels.

1. *Impaction of the Small Bowel.*—This is characterized by suppressed peristalsis, constipation and depressed attitude of the patient. In the early stages the temperature, pulse and visible mucous membranes usually remain practically normal, but if the case is neglected they will gradually become abnormal. The pains are more of the mild type, with intermittent spells of greater uneasiness. The patient seeks recumbency for considerable periods, often shows icterus, and diarrhea is frequently observed, which is of a considerably foul nature. The appetite is usually better in this form of colic than in other forms.

This condition is treated by the administration of an aloes bolus or hypodermic injections of arecoline hydrobromide or eserine salicylate, followed by small and often repeated doses of *nux vomica per os*.

2. *Impaction of the Large Bowel.*—This consists of an accumulation of feces in the cecum, colon or rectum. The most common of these is the involvement of the large colon. It has been my experience that it is rather difficult to differentiate, whether the trouble is due to the involvement of the cecum or colon, unless it can be accomplished by rectal exploration. Impaction of the cecum usually is of a chronic nature, with periodic and protracted pains. Impaction of the colon is characterized by more or less of an acute condition.

In this form of colic, rectal examination is of great value in establishing a diagnosis. The accumulated mass, unless too far forward, can be felt through the walls of the rectum as a more or less doughy mass. There is also usually more or less displacement of the bowel, due to the weight of the accumulation. Often the small intestines are found to be filled with gas, especially if the condition has existed for some time.

In general the characteristic symptoms are manifested by mild, periodic, colicky pains, couching walk, hesitancy in lying down, bracing of the hind parts against some convenient wall, and suppressed peristalsis. This form of colic occurs nearly always during the fall and winter months when the horses are fed on dry, coarse feed, such as corn-stalks and straw.

The most valuable treatment of this condition consists of high rectal injections of large quantities of water. The farther one can insert the tube into the rectum the better. Several bucketsful of warm water should be pumped in. A considerable portion of the water will be forced out by straining, but some will flow forward and soften the accumulated mass. Some of the

rectal locks on the market are of great value in forcing the water forward.

As to purgatives, oils are to be preferred to the aloes bolus. Either raw linseed oil or one of the various neutral mineral oils on the market is suitable. From one pint to a quart should be given every twelve hours until relief is obtained. I often add to the oil some antiferment to prevent the formation of gas. Small and often-repeated doses of *nux vomica* are also prescribed for their stimulative effect on the bowel.

COLIC DUE TO DISPLACEMENT OF THE BOWEL

This form of colic includes such conditions as volvulus, torsion, intussusception and diaphragmatic, inguinal or scrotal hernia.

Considered collectively, they are characterized by very violent, colicky symptoms, of a very acute nature. With the exception of intussusception, whose symptoms are not always of such an acute nature, the pains are intermittent, sharp and rapidly increase in duration and intensity in a few hours, causing the animal to go through the most violent demonstrations, with entire disregard to self-inflicted injury. The animal will get up and down repeatedly, often falling with violent force to the ground. When standing, it walks about with head lowered and gait unsteady. The pulse soon becomes weak, mucous membranes are injected and there is trembling of the muscles at various parts of the body.

Rectal examination is often of material aid in diagnosis, especially if the displacement is of the colon. Where there is displacement of the small intestines, one can often suspect it by the intense bloating sometimes found in the latter.

Treatment is very unsatisfactory except in case of strangulated hernia, in which case surgical intervention is the usual method. Occasionally the displacement might be corrected by rectal manipulation, but I have found that it is an exceedingly difficult thing to accomplish, as one has not enough leverage to handle the weight involved. Rolling the patient is also advocated but I have never attempted it in my practice.

If diagnosis can be established early in the attack, stimulation of peristalsis by the use of *eserine* or *arecoline*, together with liberal use of oil, may be of benefit.

FLATULENT COLIC

This is ordinarily known as acute indigestion, intestinal tympany or wind colic. It is due to the fermentation of undigested

food causing a rapid accumulation of gas in the digestive tract. Either the stomach or intestines may be involved. If the stomach alone is affected the condition is closely allied to acute dilatation of the stomach from overfeeding.

The most outstanding symptom is a rapid distension of the abdomen by the gas. At first only the right side may be distended, but later as more gas accumulates, both sides will be about equally affected. If the distension is extreme the animal lies down with great care and rolls but little. Most of the usual symptoms of colic are in evidence. The animal being in great pain, breathing is greatly increased, being short and broken, now and then with a short-drawn sigh. The pulse is fast and weak. The visible mucous membranes are highly injected. Temperature may be slightly elevated. Patchy perspiration covers the body. Peristalsis is replaced by tinkling sounds. If relief is not soon attained the patient succumbs in a few hours.

Enterocentesis should be the first line of treatment resorted to in this ailment, especially if the flatulence is severe. However, this will only be of benefit in intestinal flatulence. In gastric flatulence, the stomach tube should be resorted to at once. After the gas has escaped through the canula, some antiseptic, well diluted with water, should be injected directly into the bowel through the canula, to counteract the formation of more gas. Antiseptics useful for this purpose are carbolic acid, liquor cresolis compositus and eucamphine.

In order to free the bowel of the fermenting material, purgatives should at once be given. The quick-acting ones, such as eserine, are to be preferred. Salol or naphthalin, in two-dram doses, should be given *per os*.

SPASMODIC COLIC

This form of colic is characterized by sharp and intermittent pains alternating with periods of apparent easiness. It is usually caused by large drinks of cold water when the animal is warm; indigestible food; cold rains; drafts; etc. It is more often met with in highbred, nervous horses. An animal suffering from this form of colic evinces the most intense pain; throwing itself recklessly down; rolls; gets up; paws; strikes, sweats and makes frequent attempts to pass urine. During periods of ease the animal may go to eating for a short time, only to have the attack recur with equal or more severity than before. Peristalsis is generally greatly increased. Diarrhea often becomes an

associated symptom and though spasmodic colic will not, as a rule, cause great concern, it may lead to volvulus, intussusception, ruptures, etc.

Antispasmodics are indicated for the treatment of this form of colic. Morphine sulphate hypodermically in four-grain doses, or chloral hydrate in one-ounce doses, well diluted with water and given *per os* may be used.

EMBOLIC COLIC

This form is rather difficult to differentiate from other forms of colic. The attack comes on with no regard for digestive periods. In other respects the symptoms are very similar to those of spasmodic colic except that diarrhea does not occur, as is sometimes the case with the latter. The most practical diagnostic aid is the history of previous similar attacks, occurring at variable hours from no apparent cause.

As to treatment, exercise is justified in order to raise the blood pressure with hope that by so doing the thrombus may be disintegrated or collateral circulation hastened. Anodyne medicines, such as morphine or chloral, are also indicated to lessen the pain.

PROGRESS IN TUBERCULOSIS ERADICATION

The annual report of the Tuberculosis Eradication Division of the Bureau of Animal Industry for the fiscal year ending June 30, 1923, contains much information regarding the progress of the work. The following, taken from this report, will be of undoubted interest to veterinarians engaged in the movement.

There were tested during the year approximately 3,500,000 head of cattle, from which were removed about 114,000 reactors, which was slightly over 3 per cent of the total cattle tested. These reactors were obtained on 31,500 infected premises.

The accredited herds at the end of the year totalled 28,500, containing about 615,000 head of cattle. This is an increase of approximately 76 per cent in herds and 69 per cent in cattle.

The once-tested free herds at the end of the fiscal year were over 312,000 containing over 2,700,000 head of cattle, an increase of 93 per cent in herds and 76 per cent in cattle.

The total cattle reported under supervision at the end of the year was about 4,500,000.

TEMPERATURE, PULSE, AND RESPIRATION OF FOXES

By KARL B. HANSON and H. L. VAN VOLKENBERG

Bureau of Biological Survey, U. S. Department of Agriculture.

A study of the body temperature, frequency of pulse, and rate of respiration of apparently healthy foxes was undertaken by the writers over the period from December, 1919, to May, 1923 inclusive, on foxes at the U. S. Experimental Fur Farm, Keeseville, N. Y., and on various private ranches, to determine if possible the normal in these matters. Observations also were made of sick foxes to ascertain whether the data regarding temperature, pulse, and respiration would be of value in diagnosing disease.

While making the necessary observations, foxes over two months old were restrained by fastening a pair of self-locking tongs around the neck, each animal being laid on its side and an assistant clasping the handle of the tongs and the front legs of the fox in one hand and the hind legs in the other. Pups under two months old were held either in the hands or arms of an assistant.

The temperature readings were taken with a clinical thermometer, inserted into the rectum and allowed to remain there three to five minutes, after the mercury had been shaken below 95° F. The pulse frequency was obtained by palpation of the femoral artery. The respiration frequency was determined by counting the rise and fall of the sides or ribs. In pups less than six weeks old the pulse rate was not taken by palpation of the femoral artery, but the rate of heart beats was determined by auscultation of the thorax. A physician's stop watch was used in counting the pulse beats and respiration.

TEMPERATURE, PULSE, AND RESPIRATION OF FOXES OF DIFFERENT AGES

In the following table is given a summary of the temperatures and frequency of pulse and respiration of apparently healthy foxes (*Vulpes fulva*) of different ages:

Age (in Days)	No. of Observations	Temperature		Pulse		Respiration	
		Average	Range	Average	Range	Average	Range
6	3	97.2	96.4-97.8	269*	240-288*	58	47-69
8-16	40	97.7	96.4-98.6	200*	144-300*	41	24-67
22-25	6	99.8	99.0-100.5				
30-39	19	101.3	100.4-102.6	159*	144-180*	56	36-78
40-49	33	102.4	99.9-105.0	140	108-180	63	36-96
50-59	34	102.5	100.5-104.8	141	108-180	50	30-84
68-72	13	103.2	101.8-104.3	152	132-168	48	36-66
87	14	105.0	104.4-105.6	155	132-198	122	42-216
100	25	102.8	100.4-105.8	176	138-234	92	30-192
130	24	104.2	101.5-106.0	152	138-192	95	32-168
Adults	419	103.9	101.0-107.9	130	71-274	54	20-216

*Heart beats.

In young fox pups the temperature tended to increase with age, a condition just the reverse of that observed in many species of domestic animals. This was probably due to the fact that catching and holding the older animals is associated with more excitement and struggling. The frequency of the pulse tended to decrease with age, while the respiration rate showed no marked change except that it became more variable.

After foxes were a month old a wide range was observed in the temperature, pulse, and respiration. This extreme variability in the same and in different foxes is probably due to the fact that the older animals become greatly excited and struggle considerably when held. Indications are that the temperature, pulse, and respiration observed in the average fox caught and held are frequently not the actual normal but above it.

SUMMER AND WINTER RECORDS

Following is a summary of the summer and winter records of the temperature, pulse, and respiration of foxes of the species *Vulpes fulva* from observations made at the U. S. Experimental Fur Farm, Keeseville, N. Y., the winter records being taken during December, January and February, and the summer records during June, July and August.

Season	No. of Observations	Temperature		Pulse		Respiration	
		Average	Range	Average	Range	Average	Range
Winter	60	103.6	101.0-106.0	146	84-250	35	26-42
Summer	44	103.9	100.7-106.6	161	124-264	82	27-246

There was no marked difference between the summer and winter records of the temperature readings and the frequency of pulse. The rate of respirations, however, was greater in the winter. On exceptionally hot days some foxes tended to show a higher temperature than usual.

DATA FROM MALE AND FEMALE FOXES COMPARED

A comparison of the temperature, pulse, and respiration of apparently healthy adult males with those of apparently healthy adult females of the species *Vulpes fulva* is given below:

Sex	No. of Observations	Temperature		Pulse		Respiration	
		Average	Range	Average	Range	Average	Range
Male	208	103.3	101.0-107.9	127	71-264	51	21-198
Female	211	104.4	101.0-107.4	134	84-198	56	20-216

The average temperature was higher in the males than in the females. There was no appreciable difference, however, in the pulse and respiration rate. Although there may be a difference in temperature due to sex, it was observed that many males had a higher temperature than many females, as indicated by there being practically no difference in the range of temperatures of the two sexes.

EFFECT OF EXCITEMENT ON THE TEMPERATURE, PULSE, AND RESPIRATION

To determine the effect of excitement on the temperature, pulse, and respiration, observations were made upon 83 foxes coincident with the administration of anthelmintic treatment. These animals were confined in small cages, which eliminated chasing in catching. Each one was caught, weighed in a burlap bag, and given the anthelmintic dose after removal from the bag, and the temperature, pulse, and respiration of each were taken three times: (1) Just after catching; (2) just after removal from the bag; and (3) while the dose was administered. A summary of the average temperature, pulse, and respiration records of these animals follows:

When Taken	Average Temperature	Average Pulse	Average Respiration
After catching.....	103.7	130	65
After weighing.....	104.6	136	70
While administering dose.....	104.7	142	87

To emphasize more clearly the rapid and great changes which occurred in the temperature, pulse, and respiration in some individuals in the above test, four cases are cited:

Fox No.	After catching			After weighing			When administering dose		
	Temp.	Pulse	Resp.	Temp.	Pulse	Resp.	Temp.	Pulse	Resp.
19	104.3	96	36	106.0	168	52	106.8	90	100
25	101.5	135	39	102.6	150	39	104.2	138	93
22	104.1	162	38	105.3	150	100	106.5	156	210
18	103.0	138	44	105.5	144	160	106.0	150	144

The above results demonstrate that the temperature, pulse, and respiration of foxes may be subject to rapid and marked changes, especially if the animal is of a highly nervous temperament.

The average respiration frequency of 53 foxes which were not caught and held and which were disturbed as little as possible while under observation, was 32, with a range of 21 to 48. It should be noted that this average and range is considerably less than in those foxes which were caught and held. In order to obtain the normal rate of respiration of the average fox, the indications are that the animal should not be caught or disturbed. It is believed that the same holds true with regard to the temperature reading and pulse rate. It is impossible, however, to obtain these without catching the animal and disturbing it.

BLUE FOXES

In the case of blue foxes (*Alopex spp.*) 67 observations were made with the following showing of temperature and pulse:

	Average	Range
Temperature	104.8	102.4-107.7
Pulse	126	72-162

In the blue foxes, as in the blacks, crosses, and reds, a marked range and variation of the temperature readings and pulse rate were observed. The blue foxes showed a higher average temperature. This may have been due to the fact that most of them were confined in large pens and had to be chased considerably before they could be caught.

EFFECT OF DISEASE

To determine the temperature, pulse, and respiration of sick foxes, in outbreaks of fox influenza, 104 observations were made with the following results:

	Average	Range
Temperature	103.1	99.0-106.5
Pulse	121	68-380
Respiration	29	18-40

The temperature readings and the frequency of pulse and respiration gave no information of assistance in the diagnosis of fox influenza. The rhythm and strength of the pulse and the rhythm, intensity, and sounds of respiration frequently were a better index of the animal's condition than the rate.

The following cases are cited to demonstrate that temperatures of less than 100 degrees in sick foxes over two months old frequently indicate an unfavorable prognosis:

Blue fox No. 4 showed a temperature of 96.4 about two hours before death. This animal suffered intoxication from a dose of chloroform, used in an anthelmintic test. The temperature of this animal when well ranged from 103.8 to 107.2.

Blue fox No. 6, the temperature of which normally ranged from 102.6 to 104.9, died about an hour after showing a temperature of 98.2. This animal suffered intoxication from a dose of thymol, used in a test for the removal of intestinal parasites.

Red fox No. 3, apparently healthy, showed a temperature of 105.2 before the administration of a toxic dose of oil of chenopodium. About an hour before dying, and while manifesting marked prostration, this animal showed a temperature of 101.4.

In only one instance, the following, have we observed that a fox had a higher temperature when sick than when well.

Red fox No. 31, when apparently well, gave temperature readings ranging from 104 to 105. About a week after whelping a litter of pups, she became sick and showed a temperature of over 110 degrees. As the thermometer scale was graduated to only 110 degrees, the exact temperature could not be determined. Upon autopsy, endometritis and lesions indicating a generalized infection were observed.

CONCLUSIONS

The temperature readings of young fox pups tend to increase with age, while, to an extent, the pulse frequency decreases. After reaching seven weeks of age the temperature, pulse, and respiration of foxes held and handled while under observation were found subject to sudden changes and a wide range of variation. This is probably due to the nervous temperament which the animals develop after reaching a certain age.

In apparently healthy adult foxes, caught and held, it was found that the average temperature was 103.9, with a range from 101.0 to 107.9; the average pulse rate was 130, with a range from 71 to 274; the average frequency of respiration was

54, with a range from 20 to 216. It is not believed that these represent the actual normal, since a certain deviation apparently occurs when the animal is disturbed by being caught and held.

There was no marked difference between the summer and winter records of temperature and frequency of pulse. The rate of respiration, however, was higher in summer than in winter.

Females showed a higher average temperature than males, but there were many exceptions. The pulse and respiration rate differed only slightly in males and females.

Increased temperature, pulse, and respiration apparently were caused by the unavoidable excitement and struggling associated with catching and handling.

The respiration frequency in foxes which were not handled or disturbed while under observation was lower and less variable than in those caught and held. The average frequency was 32, with a range of 21 to 48. The figures probably approximate closely the actual normal respiration rate of foxes.

The average temperature of blue foxes was 104.8 and the pulse 126. In blue foxes, as in blacks, crosses, and reds, the temperature and pulse were subject to rapid changes and a wide range of variation.

The temperature readings and the frequency of pulse and respiration of foxes usually offer little information of clinical importance. The use of the thermometer apparently is limited largely to the detection of subnormal temperatures attended with an unfavorable prognosis, and to the detection of some cases of marked pyrexia. Temperatures of less than 100 degrees in foxes over two months old usually are subnormal. Clinically, the rhythm and strength of pulse and the rhythm, intensity, and sounds of respiration apparently are of more importance than the rate.

AT MONTREAL

It is said that during the recent A. V. M. A. meeting, in Montreal, a visitor from the United States had been imbibing rather freely, if not wisely. He was studying one of the old churches, on which were placed twelve heroic bronze figures of the apostles, high up on the wall. Just at this moment a fire alarm sounded. The American looked up at the statues and said, "Don't jump boys, the firemen will be here in a minute with the net!"

SOURCE OF THE VITAMINS IN MILK*

By LOUIS A. KLEIN,

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Three vitamins have been shown to be present in milk, namely, fat-soluble A, water-soluble B, and the antiscorbutic vitamin, also called vitamin C. Milk may contain other vitamins but the presence of only these three has been proven conclusively. Ninety percent or more of the fat-soluble A is contained in the milk fat and therefore, while cream and whole milk are rich in this vitamin, skim milk contains a comparatively small quantity of it. On the other hand, there does not appear to be any material difference in the content of vitamin B and vitamin C in whole and in skim milk.

The association of vitamin A with the milk fat naturally raised the question whether the quantity of vitamin A contained in whole milk and in cream is proportionate to the percentage of fat, other conditions being the same. Only one experiment¹ has been reported in which observations were made on this point and no definite conclusions were reached. This question is, therefore, still to be determined.

RELATIVE PROPORTIONS

Fat-soluble A is present in whole milk in much greater quantity than vitamin B. Tests made on experimental animals indicate that the quantity of fat-soluble A is eight times greater than that of B.² Whole milk, cream and butter are among the most prolific sources of fat-soluble A for man. Milk, both whole and skimmed, furnishes an abundant supply of vitamin B and a variable but ordinarily adequate quantity of the antiscorbutic vitamin.

The quantity of vitamins present is not always the same in different samples of milk. The quantity of the antiscorbutic vitamin varies to a greater extent than that of vitamins A and B. Funk,³ in 1914, expressed the thought that the antiscorbutic potency of milk might be influenced by the feed of the cow and in 1918 Steenbock, Boutwell and Kent⁴ expressed a similar opinion with regard to the variations in the quantity of fat-soluble A in butter fat. Other investigators expressed similar

*Presented at the annual meeting of the American Association of Medical Milk Commissions and Certified Milk Producers' Association, at San Francisco, Calif., June 25 and 26, 1923.

opinions with regard to these vitamins and vitamin B, but it was not until comparatively recently that the question was determined by feeding milk from cows, on a known diet or ration, to experiment animals, usually pigs and rats, under carefully controlled conditions and noting the results. Studies of the influence of the diet or ration of the cow on the antiscorbutic potency of milk were made by Hart, Steenbock and Ellis,⁵ Dutcher and his co-workers,⁶ and Hess, Unger and Supplee,⁷ and the results published in 1920, while similar studies of the effect of the cow's diet or ration on the quantity of vitamins A and B in the milk were made by Kennedy and Dutcher⁸ who reported their results in 1922. Although these experiments were carried out under different plans, the results of every one of them indicate that the quantity of the three vitamins excreted in the milk depends upon the quantity taken in with the food.

DEPENDENT ON RATION

It was observed that when the cows were changed from a vitamin-rich to a vitamin-poor diet or ration, a corresponding change occurred in the milk in 2 to 4 weeks^{7,9} and that when a change was made from a vitamin-poor to a vitamin-rich diet or ration, the experiment animals being fed on the milk showed the effects of an increase in the vitamins within several days.⁸ From these observations and others of a similar character, it has been concluded that the vitamins are not stored in the animal body in any considerable amount and that the constant presence of vitamins in the milk in adequate quantity will depend on the continuous feeding of a vitamin-rich ration. The vitamin content of the various cattle feeds is therefore of practical importance in the production of vitamin-rich milk.

Considerable information on this phase of the subject has been obtained from the investigations which have been reported up to the present time.⁹ It has been found that those feeds which consist largely of the leaves of plants, such as grass, clover, alfalfa and other forage plants, are, when in the green state, the most prolific sources available of fat-soluble A and the antiscorbutic vitamin, and that they supply as great a quantity of vitamin B as any other kind of feed. When these plants are dried and cured to make hay, however, much of the antiscorbutic vitamin is destroyed or rendered inert. This explains why milk from cows on green pasture has a greater antiscorbutic potency than milk from cows on dry feed when tested on guinea pigs^{5,6,7}.

When the pasture is dried and bleached, however, as occurs during a drought, the antiscorbutic potency of the milk is no greater than when the cows are on dry feed. Drying of the pasture also decreases the quantity of fat-soluble A in the milk¹⁰ and there is reason to believe that the same thing will occur when hay is exposed to the sun too long in the swath.¹¹ In a study of the effect of maturity on the content of vitamin B in alfalfa, clover and timothy, it was found that hay made from young plants contained a greater quantity of this vitamin than hay made from mature plants.¹² When mowing is done at a suitable time and curing is properly done, however, hay is for all practical purposes as rich in fat-soluble A and vitamin B as the green forage, but the quantity of the antiscorbutic vitamin present is considerably less.

VITAMINS IN GRAINS

The grains, corn, oats, wheat, rye, and barley, contain an abundant quantity of vitamin B and a small quantity of fat-soluble A, but are deficient in the antiscorbutic vitamin.⁹ The air-drying to which these crops are subjected has no effect on the A and B vitamins they contain.

There is no uniformity in the vitamin content of the different mill feeds or concentrates. This is because the individual feeds consist of different parts of the whole seed or grain and these different parts do not contain the vitamins in the same proportion. Wheat bran contains a relatively large quantity of vitamin B, but is deficient in vitamin A and the antiscorbutic vitamin. Wheat middlings contains about twice as much vitamin B as bran¹³, but is no richer in the other two vitamins. No tests are reported on the vitamin content of oil meal, cotton-seed meal and soy-bean meal, but the seeds from which these meals are prepared after the oil has been extracted have been shown to contain an abundance of vitamin B and a relatively large quantity of vitamin A. There is no information available at present concerning the vitamin content of gluten meal, gluten feed, hominy and dried brewers' grains.

No reports have yet been published of tests made for the specific purpose of determining the vitamin content of corn ensilage. In their study of the influence of the diet or ration of the cow on the antiscorbutic properties of the milk, Hart, Steenbock and Ellis⁶ demonstrated that ensilage made from corn, well-matured and partly dried, was deficient in the antiscorbutic

vitamin but there are no other experimental data on the subject. When ensilage corn is cut early and put into the silo green, it is no doubt rich in vitamins, but the effect on these substances of the fermentation which occurs in the silo is not known.

Of the roots used as cow feeds, only carrots contain vitamins A and B in sufficient quantity.⁹⁻¹⁴ The antiscorbutic vitamin is present in relatively large quantity in carrots and sugar beets.⁹ No tests of dried beet-pulp have been reported, but from what is known of the susceptibilities of the antiscorbutic vitamin it appears very likely that it is destroyed entirely or very much reduced in quantity or potency by the processes to which the beet pulp is subjected.

The information available at this time as to the vitamin content of the various cow feeds is by no means complete. Further investigation is needed, not only as regards certain feeds, the vitamin content of which has not yet been determined, but also as to the influence of soil conditions on the vitamin content of plants, it being now generally assumed that the plants obtain the vitamins from the soil.

EFFECTS OF PASTEURIZATION

It has been demonstrated that certain influences, to which milk may be subjected after it is drawn from the cow, decrease its antiscorbutic potency. Pasteurized milk has been shown to be weaker in its antiscorbutic power than unheated milk. Babies which developed incipient scurvy while being fed on pasteurized milk recovered when they were given raw milk, fruit juices, or potato water.¹⁵

The lower antiscorbutic potency of the pasteurized milk is not attributed entirely to the heating to which it is exposed, but partly to the circumstances that it is heated in the presence of air and partly to the age of the milk. When milk is heated in a vacuum, it may be exposed to temperatures as high as 240° F., as in the preparation of dried milk by the Just roller process, without any material weakening of its antiscorbutic power, while exposure to oxygen alone will render it deficient in this respect. It has also been demonstrated that the antiscorbutic power of unheated milk deteriorates with the passage of time, after it has been drawn from the cow. This is an observation which has a practical application in connection with the time of the delivery of milk. It should be noted that the cases of scurvy reported above, as developing on a diet of pasteurized milk,

were of an incipient character. It is believed to be exceptional for a well-marked case of scurvy to develop on a diet of this kind, as milk, even when pasteurized, possesses some antiscorbutic properties.¹⁶

Neither pasteurization nor age seems to have any effect on the potency of the vitamins A and B in the milk.

REFERENCES

- ¹Drummond, J. C., Conrad, K. H., and Watson, A. F., *Biochem. Journal*, vol. 15, no. 4, 1921, pp. 546 to 552.
- ²Steenbock, H., Sell, M. T., and Nelson, E., *Wisconsin Sta. Bull. No. 339*, 1922, pp. 123 and 124, 130 to 132.
- ³Funk, C., *Die Vitamine*, 1914.
- ⁴Steenbock, H., Boutwell, P. W., and Kent, H. E., *Jour. Biol. Chem.*, vol. xxxv, 1918, 517.
- ⁵Hart, E. B., Steenbock, H., and Ellis, N. R., *Jour. Biol. Chem.*, vol. xlii, no. 3, 1920, pp. 383 to 396.
- ⁶Dutcher, R. A., Eckles, C. H., Dahle, C. D., Mead, S. W., and Schaefer, O. G., *Jour. Biol. Chem.*, vol. xlv, no. 1, 1920, pp. 119 to 132.
- ⁷Hess, A. J., Unger, L. J., and Supplee, G. C., *Jour. Biol. Chem.*, vol. xlv, no. 1, 1920, pp. 229 to 235.
- ⁸Kennedy, Cornelia, and Dutcher, R. A., *Jour. Biol. Chem.*, vol. l, no. 2, 1922, pp. 339 to 359.
- ⁹*The Vitamine Manual*, Walter H. Eddy.
- ¹⁰Drummond, J. C., Conrad, K. H., and Watson, A. F., *Biochem. Jour.*, vol. xv, no. 4, 1921, pp. 546 to 552.
- ¹¹*Wis. Sta. Bull. 339*, 1922, pp. 123 and 124, 130 to 132.
- ¹²Osborn, T. B., and Mendel, L. B., *Jour. Biol. Chem.*, vol. xxxix, no. 1, 1919, pp. 29 to 34.
- ¹³Bell, M., and Mendel, L. B., *Am. Jour. Physiol.*, vol. lxii, no. 1, 1922, pp. 145 to 161.
- ¹⁴Steenbock, H., and Gross, E. G., *Jour. Biol. Chem.*, vol. xl, no. 2, 1919, pp. 501 to 532.
- ¹⁵Hess, Alfred J., *Proceedings Soc. Exp. Biol. and Med.*, vol. xiii, no. 3, 1915.
- ¹⁶Hess, Alfred J., and Unger, Lester J., *Am. Jour. Dis. of Children*, vol. xvii, 1919, pp. 221 to 240.

ADVERTISING AN ACCREDITED HERD

The Federal Bureau of Animal Industry is in receipt of an interesting photograph from Oregon which is indicative of the interest being taken in accredited-herd work, by one of the Japanese farmers. This progressive individual, who has established a tuberculosis-free accredited herd, has advertised the same by placing the words "T. B. Free Accredited Jerseys" in large letters on the fence in front of his place so as to make the same visible from the main state highway, and the interurban and steam lines which pass the place. He has, undoubtedly, found this a valuable means of advertising.

VETERINARY CONFERENCE NEXT JANUARY

The Annual Conference for Veterinarians will be held at the Veterinary School of the University of Pennsylvania on Tuesday and Wednesday, January 8-9, 1924. The program will consist of papers and discussions of special interest to practitioners. Reserve the dates and make your plans to attend. Those who attended the previous conferences felt that their time had been well spent. Programs will be printed and mailed about the latter part of December.

URINARY CALCULI IN SHEEP¹

By HARRY P. SCOTT, *Brush, Colorado*

From the scarcity of literature on this subject, I am of the belief that the attention of very few authorities has been called to it. Since so very little has been published in regard to this condition, I wish to state that the following is more on the order of a case report than a paper.

On October 25, 1922, a band of 4200 lambs was shipped into Fort Morgan from Roswell, New Mexico. The band was divided equally and placed on farms about eight miles apart. There were in the band several hundred very light lambs, so that the average for the lot was only 44 lbs. Although they were small and thin all appeared to be in a healthy, thrifty condition and continued so up until the time that losses first occurred from calculi.

That portion of the original band in which the losses occurred was turned out, at first, into a corn field and had access also to alfalfa pasture. At night they were corralled and fed alfalfa hay. The corn field and pasture lasted about a month; then the lambs were kept penned and fed a ration consisting of shelled corn, linseed meal and alfalfa hay.

Salt was supplied, first in blocks, but when the lambs were penned up it was supplied loose and fed in a trough. The oil meal and shelled corn were gradually increased, until the lambs were on full feed, when they were taking one and one-half pounds of corn and four ounces of meal per day. The feeder also stated that at this time they would clean up 100 pounds of pulverized salt per day.

No losses, other than could easily be accounted for, were experienced until the 25th of March. At this time two lambs suddenly died and a number were noticed to be off feed and acting peculiarly. The next day two more lambs died and several more were off feed. We were called in at this time and posted two lambs. On the first we found the abdominal cavity filled with an amber-colored fluid. Upon further examination a large clot of blood was found adhering to and enmeshed in the omentum.

Search for the location or origin of the hemorrhage revealed a rupture on the bladder, some three inches in length. The walls of the bladder in this case showed no inflammatory changes, nor

¹Read before the semi-annual meeting of the Colorado Veterinary Medical Association, Fort Collins, Colo., May 31-June 1-2, 1923.

were the kidneys altered visibly. All other organs of the body were normal in appearance and lymph glands showed no signs of congestion. The second lamb posted revealed, in addition to a ruptured bladder, lesions of a chronic form of cystitis, as well as petechial hemorrhages on the kidney. In both cases the bladders were completely emptied, so that no calculi were found.

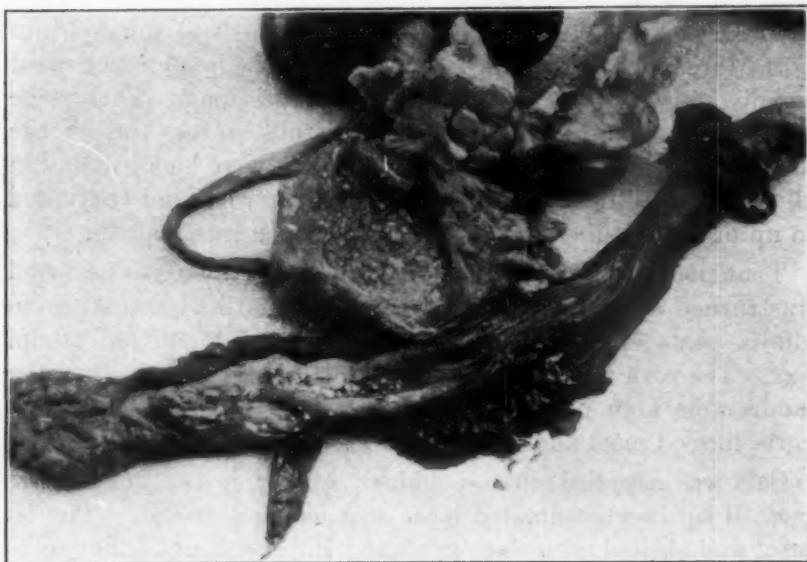


Fig. 1. Bladder and urethra opened to show calculi.

The next day several more lambs were posted and one was found in which the bladder had not ruptured, but in this case both ureters were greatly distended and the kidneys were twice as large as normal. Starting at the end of the penis the urethra was traced until the obstruction was found. The obstruction consisted of a mass of very small calculi, located posterior to the sigmoid flexure.

There being no known treatment for this condition, the owner was advised to ship all the wether lambs that were in a marketable condition and to reduce the meal and corn ration.

The complete urogenital tract was taken into Denver, by Dr. Stout of the Federal Service, and there an analysis was made both of the urine and of the calculi, which showed the following:

URINE

Hippuric acid (microscopically).....	present
Protein.....	present
Albumin.....	none
Reducing matter (Fehling).....	none

CALCULI

Consisted of crystalline deposit of hippuric acid and amorphous, white lumps which were wholly phosphates.

A report made by the Agricultural College showed a specific gravity of 1020, with albumen present but no other unusual conditions. The calculi were found to be composed of magnesium phosphate.

The American literature seems to be particularly free from cases of this kind. The only discussion that we can find of the condition which is at all worthy of consideration is in Bulletin 112 of the Iowa Experiment Station. From some previous experience they had begun to suspect sugar beets as the cause of urinary calculi in sheep. As a consequence, they took four lots of lambs. To the first eleven they fed hay and grain only. To the second lot of nine they gave, in addition, corn ensilage. To the third lot of eleven they added mangels and to the fourth lot of eleven, sugar beets.



Fig. 2. Bladder showing two large blood-clots; penis below, with urethra slit open, revealing numerous small calculi.

The lambs were fed from September 11 to April 14. Altogether, three of the sugar-beet lambs died, one on January 31, one on February 18 and one on April 11. All three showed the presence of calculi in the bladder. On slaughtering, one of those left in the sugar-beet lot showed calculi in the kidneys, so that altogether, of the eleven given sugar beets, four showed the presence of calculi, whereas this condition was not present in any of the other lots. This seemed to be a strong case against sugar beets.

In the Colorado feeding district, tops are frequently fed to lambs for a short time after the beginning of the feeding season, but as far as we know no continuous feeding of the beets themselves has been practiced. The lambs under consideration in this article never received either the beets or the tops, so that it does not seem possible to attribute the condition in this case to the feeding of beets.

Suspicion points to the linseed meal, although there are other instances where as much oil meal was fed without untoward results.

BULLETIN ON SWINE DISEASES

The diseases and ailments which are important factors in reducing the profits of hog raisers, particularly the old enemy, hog cholera, are described and prescribed for in a new Farmers' Bulletin, 1244, "Diseases, Ailments, and Abnormal Conditions of Swine," prepared by Dr. T. P. White, of the United States Bureau of Animal Industry.

Although the ravages of hog cholera have been reduced sixty per cent below the worst years, lack of attention to herds and failure to apply all the precautions available leave it still the greatest menace to the industry. Much of the bulletin is devoted to this disease and to a number of diseases which in the time of a cholera outbreak go unnoticed or are diagnosed as cholera. These other diseases include anthrax, epilepsy, gastroenteritis, necrobacillosis, pleurisy, pneumonia, poisoning, swine plague (hermorrhagic septicemia), tuberculosis, and worms.

Many other diseases and abnormal conditions, including such common troubles as thumps, sore mouth, sunstroke, rickets, paralysis of the hind quarters, and rheumatism, are described and proper treatments are given. There are also chapters on the prevention of disease and on the causes of losses during shipment.

SINGLE TUBE METHOD FOR DETERMINING CARRIERS OF BACTERIUM PULLORUM¹

By F. R. BEAUDETTE, Manhattan, Kan.

The fact that poultry production is a profitable business has stimulated those engaged in this enterprise to give more attention to the problem of disease control. Since white diarrhea is one of the first diseases to make its appearance after hatching, and since the losses from this disease are very great, poultrymen are generally coming to see the need of controlling this scourge.

It has been known for some time that the hen is, in most cases, the source of infection. The fact that carriers may be detected by means of the agglutination test is also well known. However, poultrymen have not taken advantage of the test to any great extent, except in a few sections where campaigns have been carried on by state institutions. Perhaps the cost of the test has made it unprofitable, except in the case of pure bred flocks. The test is simple, yet, when conducted on a large scale, it involves considerable time and materials. Therefore, the advantages of a method requiring less time and materials can readily be appreciated by the laboratory worker. It is the purpose of this paper to describe a test which has proven equally as reliable as the old routine method and still requires only one agglutination tube.

The routine method employed in this laboratory was to secure a sample of blood from the fowl to be tested and make four dilutions of the serum as follows: A series of four tubes was used, 1.9 cc of saline was placed in the first, and 1.0 cc in each tube thereafter. One-tenth of a cubic centimeter of serum was then placed in the first tube and thoroughly mixed. From this one cubic centimeter was transferred to the second tube and thoroughly mixed. Transfers were made from the second to the third and from the third to the fourth tube, and a cubic centimeter from the fourth tube was discarded. Each of the four tubes now contained one cubic centimeter of a 1-20, 1-40, 1-80, and 1-160 dilution, respectively, of serum. To each tube was then added one cubic centimeter of the antigen, which doubled the dilution in each case, so that the final dilutions were 1-40, 1-80, 1-160, and 1-320. The tubes were incubated at 37°C. from 24 to 72 hours and readings made. If complete agglutination

¹Contribution No. 56, Department of Bacteriology, Kansas State Agricultural Experiment Station.

occurred in the 1-80 dilution, or above, the sample of serum was considered as being from an infected fowl.

In view of the fact that complete agglutination in dilutions of 1-80 or higher indicates infection, the use of more than one dilution seemed superfluous in routine testing and the test herein described is based on this point.

TABLE I
COMPARISON OF SINGLE-TUBE TEST WITH ROUTINE METHOD
(FLOCK OF H. E. R.)

Hen No.	Routine Method			Single-Tube Method
	Serum Dilution			Serum Dilution
	1-40	1-80	1-160	Between 1-80 and 1-100
110	0	0	0	0
116	0	0	0	0
109	0	0	0	0
107	0	0	0	0
119	0	0	0	0
111	0	0	0	0
105	XXXX	XXXX	XXXX	XXXX
120	XXX	XXX	XXX	XXXX
114	0	0	0	0
122	0	0	0	0
(FLOCK OF A. E. L.)				
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
5B	0	0	0	0
17	0	0	0	0
6B	0	0	0	0
14	0	0	0	0
V	XXXX	XXXX	XXXX	XXXX
11B	0	0	0	0
7B	0	0	0	0
1B	XXXX	XXXX	XXXX	XXXX
13B	0	0	0	0
FB	0	0	0	0

XXXX=Complete agglutination.

XXX]=Marked agglutination.

0 =No agglutination.

THE SINGLE-TUBE TEST

The sample of blood is withdrawn from the wing vein of the fowl as usual. The blood may be allowed to clot while standing in the ice-box over night, or the tubes may be centrifugalized at once. Only one drop of serum is needed. In most cases this amount will collect in a tube of blood left standing in the ice-box over night, especially if the tubes are placed in a slanting position. A capillary pipette fitted with a rubber nipple is used to obtain a small amount of serum from the clot and one drop of the serum is added to a tube containing 4 cc of highly diluted antigen. Assuming that the drop represents from 1-20 to 1-25 of a cubic centimeter, the addition of this quantity to 4 cc of antigen results in a dilution of 1-80 or 1-100 depending upon the size of the drop. The tube is thoroughly shaken and placed in an incubator at 37°C. or left at room temperature. Readings may be made at the end of 48 hours and in some cases a positive reaction can be detected in five hours at 37°C.

Table I gives in parallel columns the results obtained from the same sample of serum taken from two small flocks and tested by both methods.

This method has been used simultaneously with the method previously described and in no case have the final results differed. In fact, the one-dilution method usually gives a more clear cut reaction, probably because of the higher column of fluid to be observed. The test has several advantages over the routine method that has been used. A smaller quantity of blood is used and this makes it possible for the bleeder to obtain a larger number of samples in a given time. The use of a capillary pipette fitted with a rubber nipple has advantages over larger pipettes in obtaining serum from the clot contained in small vials. Fewer tubes are needed for making the test and less time is required in making the dilutions. Because of its greater dilution, less than half as much antigen is required. The time required for incubation is reduced by at least 24 hours. In testing samples collected by inexperienced bleeders, frequently badly contaminated, excessive growth sometimes takes place in the routine method which obscures the reading of the results. In the single-tube method this can be largely obviated by incubating at room temperature.

TUBERCULIN SENSITIVENESS CAUSED BY DEAD TUBERCLE BACILLI

By A. B. CRAWFORD, Bethesda., Md.

*Veterinary Inspector and Scientific Assistant at the Experiment
Station of the United States Bureau of Animal Industry*

As some doubt seems to remain that the injection of dead tubercle bacilli into the bodies of animals sensitizes them to tuberculin, the following experiment, made at the Experiment Station of the Bureau of Animal Industry, may prove of general interest.

On March 25, 1921, six tubes of Dorset's egg medium were inoculated with a strain of tubercle bacilli which had been under cultivation on artificial media more than a dozen years. On May 2, 1921, the growth on the tubes, which microscopically showed only acid-fast bacilli, was suspended in 100 cc of sterile physiological salt solution. The suspension was heated in a water-bath at boiling temperature for two hours, and was then cooled and shaken several hours in a shaking machine which makes about 800 revolutions per minute.

May 2, 1921. Six guinea pigs, injected intra-abdominally with the suspension as follows: Two, $\frac{1}{8}$ cc each; two, $\frac{1}{4}$ cc each; and two, $\frac{1}{2}$ cc each. The guinea pigs manifested no ill effects and showed no lesions of progressive tuberculosis when they were killed and examined *post mortem* 88 days later.

May 3, 1921. The suspension was again shaken in the shaking-machine for several hours.

May 4, 1921. Eighty-four guinea pigs, each weighing approximately 500 grams, received intra-abdominal injections of the suspension as follows: Six, $\frac{1}{16}$ cc each; six, $\frac{1}{8}$ cc each; and seventy-two, $\frac{1}{4}$ cc each.

The accompanying tables show when the sensitiveness to tuberculin was first manifest, the gradual rise in sensitiveness, and

TABLE 1. GUINEA PIGS INJECTED ON MAY 2, 1921, WITH KILLED TUBERCLE BACILLI SUSPENDED IN PHYSIOLOGICAL SALT SOLUTION.

Number of guinea pig	Dose of Suspension	Tested intra-dermally with tuberculin	Tested intra-dermally with beef broth*	Results
1	$\frac{1}{8}$ cc	May 12, 1921	May 12, 1921	Irritation caused by tuberculin greater than that caused by beef broth, but not sufficient to be termed a positive tuberculin reaction.
2	$\frac{1}{4}$ "	" " "	" " "	
3	$\frac{1}{2}$ "	" " "	" " "	
4	$\frac{1}{8}$ cc	May 17, 1921	May 17, 1921	Positive reaction to tuberculin. Beef broth—no reaction.
5	$\frac{1}{4}$ "	" " "	" " "	
6	$\frac{1}{2}$ "	" " "	" " "	

*Injections of tuberculin and beef broth were made simultaneously, the tuberculin being injected into the skin on one side of the abdomen, and the beef broth on the other side.

the period at which the sensitiveness reached its maximum.

The tuberculin used in this experiment was prepared in the Biochemic Division of the Bureau of Animal Industry, and each

TABLE 2. GUINEA PIGS INJECTED ON MAY 4, 1921, WITH KILLED TUBERCLE BACILLI SUSPENDED IN PHYSIOLOGICAL SALT SOLUTION.

Number of guinea pig	Dose of suspension	Tuberculin injected intra-abdominally	Dose of tuberculin per 500 grams weight	Results
7	$\frac{1}{4}$ cc	May 23	2 cc	Dead at 50th hour
8	" "	" "	" "	Dead at 40th hour
9	$\frac{1}{4}$ cc	May 27	2 cc	Dead at 48th hour
10	" "	" "	" "	Dead at 48th hour
11	$\frac{1}{4}$ cc	May 31	2 cc	Marked reaction; recovered
12	" "	" "	" "	Dead at 21st hour
13	$\frac{1}{4}$ cc	June 3	2 cc	Dead at 18th hour
14	" "	" "	" "	Dead at 40th hour
15	$\frac{1}{4}$ cc	June 6	2 cc	Dead at 22nd hour
16	" "	" "	" "	Dead at 22nd hour
17	$\frac{1}{4}$ cc	June 8	2 cc	Dead at 20th hour
18	" "	" "	" "	Dead at 20th hour
19	$\frac{1}{4}$ cc	June 9	2 cc	Dead at 17th hour
20	" "	" "	" "	Dead at 17th hour
21	" "	" "	" "	Dead at 17th hour
22	" "	" "	" "	Dead at 17th hour
23	" "	" "	" "	Dead at 18th hour
24	" "	" "	" "	Dead at 17th hour
25	$\frac{1}{4}$ cc	June 9	$1\frac{1}{2}$ cc	Dead at 24th hour
26	" "	" "	" "	Dead at 17th hour
27	" "	" "	" "	Dead at 24th hour
28	" "	" "	" "	Dead at 21st hour
29	" "	" "	" "	Dead at 17th hour
30	" "	" "	" "	Dead at 21st hour
31	$\frac{1}{4}$ cc	June 10	$1\frac{1}{2}$ cc	Dead at 24th hour
32	" "	" "	" "	Marked depression; recovered
33	" "	" "	" "	Dead at 24th hour
34	$\frac{1}{4}$ cc	June 10	2 cc	Dead at 20th hour
35	" "	" "	" "	Dead at 20th hour
36	" "	" "	" "	Dead at 24th hour
37	$\frac{1}{4}$ cc	June 10	$1\frac{1}{2}$ cc	Dead at 24th hour
38	" "	" "	" "	Marked depression; recovered
39	" "	" "	" "	Dead at 24th hour
40	$\frac{1}{4}$ cc	June 10	2 cc	Dead at 20th hour
41	" "	" "	" "	Dead at 20th hour
42	" "	" "	" "	Dead at 24th hour
43	$\frac{1}{4}$ cc	June 24	$1\frac{1}{2}$ cc	Dead at 21st hour
44	" "	" "	" "	Dead at 21st hour
45	" "	" "	" "	Dead at 21st hour
46	" "	" "	" "	Dead at 21st hour
47	$\frac{1}{4}$ cc	June 27	1 cc	Dead at 22nd hour
48	" "	" "	" "	No reaction
49	" "	" "	" "	Dead at 22nd hour
50	" "	" "	" "	Dead at 22nd hour
51	$\frac{1}{4}$ cc	July 11	1 cc	Dead at 16th hour
52	" "	" "	" "	Marked depression; recovered
53	" "	" "	1 "	Dead at 16th hour
54	" "	" "	" "	Dead at 16th hour
55	$\frac{1}{4}$ cc	July 25	1 cc	Dead at 32nd hour
56	" "	" "	" "	Marked reaction; recovered
57	" "	" "	" "	Slight reaction; recovered
58	" "	" "	" "	Slight reaction; recovered
59	$\frac{1}{4}$ cc	July 26	1 cc	Dead at 16th hour
60	" "	" "	" "	Dead at 16th hour
61	" "	" "	" "	Dead at 21st hour
62	" "	" "	" "	Marked reaction; recovered
63	$\frac{1}{4}$ cc	Aug. 8	1 cc	Dead at 28th hour
64	" "	" "	1 "	Dead at 6th hour
65	" "	" "	" "	Dead at 22nd hour
66	" "	" "	" "	Dead at 22nd hour
67	$\frac{1}{4}$ cc	Sept. 7	1 cc	Dead at 22nd hour
68	" "	" "	" "	Marked reaction; recovered
69	" "	" "	" "	Dead at 22nd hour
70	" "	" "	" "	Dead at 22nd hour
71	$\frac{1}{4}$ cc	Nov. 21	1 cc	No reaction
72	" "	" "	" "	No reaction
73	" "	" "	" "	No reaction
74	" "	" "	" "	Slight reaction; recovered
75	" "	" "	" "	Slight reaction; recovered

cubic centimeter was the equivalent of 0.125 gram of Koch's Old Tuberculin.

The intra-abdominal injection of killed tubercle bacilli in guinea pigs usually results in a thickening of the omentum and the formation of from two to a dozen whitish tubercles, ranging in size up to three millimeters in diameter. These tubercles are found mostly in the omentum but may also develop on the capsules of the liver and spleen and on the peritoneum.

From the foregoing experiment it is evident that sensitiveness to tuberculin is caused in guinea pigs by the injection of killed tubercle bacilli.

During the period of greatest sensitiveness, with one exception, at least three out of every four guinea pigs died within 24 hours from the injection of smaller doses of tuberculin than are tolerated without inconvenience by normal guinea pigs.

Sensitization was first observed about two weeks after the injection of the dead tubercle bacilli. It increased gradually. At the end of four weeks, an injection of two cubic centimeters of tuberculin per 500 grams weight of guinea pig generally was fatal. At the end of the seventh week, an injection of one cubic centimeter of tuberculin per 500 grams weight usually was fatal.

The degree of sensitization is relatively stationary from the seventh to the eighteenth week. The exact time at which it begins to decline was not determined. No injections were made between the eighteenth and twenty-eighth weeks. At the twenty-eighth week, a marked decline was apparent.

NOTE—In connection with the foregoing experiment it is interesting to record that with tests made at the Experiment Station some time ago it was found that guinea pigs may also be sensitized for tuberculin by subcutaneous injections of dead tubercle bacilli, even when the doses of such tubercle bacilli are too small to cause more than a slight induration at the seat of injection. Cattle injected with small doses of dead tubercle bacilli, occasionally, but not invariably, react with tuberculin afterwards.

For example, among a group of nine cattle which had received small doses of dead tubercle bacilli suspended in tuberculin, two reacted with the intradermic test about two months later, one with the subcutaneous test and none with the ophthalmic. The animal which reacted with the subcutaneous test was one of the two which reacted with the intradermic, and this animal killed and examined *post mortem* six weeks after the tuberculin tests were made, failed to show lesions indicative of tuberculosis or any other disease.

The periodic tests of commercial tuberculin made at the Station, taking the results of this work into account, now include careful studies of samples with regard to the degree of their contamination with dead tubercle bacilli. Formerly dead tubercle bacilli were quite common and abundant in some samples and practically absent from others, justifying the conclusion that it is not economically difficult to have all samples of tuberculin practically free from dead tubercle bacilli. Since then a great improvement in this respect has been effected in the tuberculin prepared and sold in the United States under Government license.

E. C. SCHROEDER.
Superintendent of Experiment Station.

CLINICAL AND CASE REPORTS

(Practitioners and others are invited to contribute to this department reports of unusual and interesting cases which may be helpful to others in the profession.)

POLYARTHRITIS AND RACHITIS IN CALVES

By D. D. Baker,

Ames, Iowa.

Senior Veterinary Student, Iowa State College

History:—Grade Holstein bull, one year of age, entered the hospital on February 6, 1923, with the following history: There are eleven in the herd, all about the same age; one has died and three others are in the same condition as this animal; aged cattle in good health. The first symptoms were noticed about six months ago, when knee and pastern joints seemed swollen and stiff; diarrhea developed, followed by constipation and loss of appetite.

Symptoms:—This animal showed slight increase of respirations and pulse, loss of appetite, marked emaciation, depression, constipation; small frame and large coarse head, indicating a stunted growth; general stiffness, avoiding movement; usually recumbent; buck-kneed standing-position, enlarged joints, and extremities of bones enlarged.

Tests:—Animal was placed on a ration consisting of middlings, oats and alfalfa hay. The subcutaneous and intradermal tests for tuberculosis were given with no reaction. Sodium salicylate 1 ounce was given *b. i. d.* over a period of four days before post mortem. Blood count showed 20,000 leucocytes and 4,000,000 red cells, indicating a slight leucocytosis and quantitative anemia.

Autopsy:—The animal had been entered for diagnosis by a nearby practitioner who wanted the calf posted. This was done on February 20. No improvement was noticeable which could be credited to the two weeks of treatment. The post mortem findings were as follows: Hair mixed in rumen contents, petechiae on mucous membrane of intestine, with a catarrhal gastroenteritis present, spleen pale, mesenteric lymph glands hyperemic, joint cavities of the stifles contained bloody synovia, extremities of long bones enlarged and cartilaginous, shafts relatively soft

and chalky, articular cartilages slightly eroded, petechiae and ecchymotic hemorrhages in marrow of femur and tibia.

Microscopic examination of the bone revealed no organisms responsible for the hemorrhages.

Diagnosis:—The condition, no doubt, was a nutritional disturbance and a diagnosis of rachitis and polyarthritis was made. As gastro-enteritis is common in either of these conditions it would be necessary to have more definite history to say whether it was a primary or secondary condition. The lesions present in the intestine were not severe enough to indicate a primary condition.

It is thought that this condition has been mistaken by some for rheumatism in calves. It might be said that a similar case in the hospital, a Holstein calf from another herd, in which several were affected, is showing slow improvement on a treatment of syrup of hypophosphites 1 ounce, *u.i.d.*, a ration of corn, oats, bran and alfalfa hay, with plenty of exercise.

SCIENTIFIC OBSERVATIONS

In the *San Francisco Chronicle*, Burt Davis, scientific farmer, of San Leandro, has found that scopolamin, the noted truth-drug, does not always work with animals but on the contrary makes colossal liars out of them.

A week ago he began to experiment. The inoculation of an honest sheep dog made it back into the shaft of a wagon and wait for the harness. A hen, given the needle, climbed from a nest of eggs and crowed. Two hogs that had been hogs all their lives mewed like cats when given a shot.

According to Davis, the only one on the farm who responded to the drug was Mrs. Davis, who, after an inoculation, told her husband exactly what she thought of married life. Davis called off the test.

A GOLDEN OPPORTUNITY

I was much interested in your recent editorial on "Pediculosis—Chiropractically Speaking," particularly B. J.'s remarks on scavengers attracted my attention, and in this connection I would like to inquire whether there are any Chiropractic Veterinary Surgeons, as my dog is greatly annoyed by a kind of scavenger called "fleas," and if adjustment would help him, I want him adjusted.

C. S.

From *Tonics and Sedatives*, Journal A. M. A.

REVIEW

BERGEY'S MANUAL OF DETERMINATIVE BACTERIOLOGY. (Arranged by a committee of the Society of American Bacteriologists, of which Dr. David H. Bergey is chairman.) 442 pages. Published by Williams and Wilkins Company, Baltimore, 1923.

Since Professor F. D. Chester, over twenty years ago, published his "Determinative Bacteriology," there has not been available to workers in the field of bacteriology any up-to-date manual to which to refer in the study and identification of microorganisms of the class schizomycetes.

Appreciating the need for a work of this kind and following up the work done by the committee on characterization and classification of the Society of American Bacteriologists, this key for the identification of species has been compiled. As stated in the preface, the Committee does not feel that the classification here offered is to be accepted as final, but more in the nature of a report of progress that may lead to a more satisfactory classification at some future time.

In examining the book the one feature most conspicuous by its absence is a cross-index of the old and new names. Only after quite a search were we able to locate old friends, listed in this new manual under their latest names only. Even after locating some of these organisms we find that in many cases few or no synonyms are given. That it was not the intention of the compilers to omit synonyms entirely is evidenced in the case of the colon organism, which we found hiding as *Escherichia coli*.

Many of the genera adopted in the new classification are new, and in view of the custom of abbreviating the name of the genus, in writing names, it would appear advisable for a definite form of abbreviations to be adopted. Perhaps this has been done elsewhere, but there appears to be no reference to it in this work.

We note that McGowan is credited with the discovery of *Alcaligenes bronchisepticus* (formerly *Bacillus bronchisepticus*) as the cause of canine distemper. This credit should go to Ferry whose preliminary report in the *American Veterinary Review* (1910) was prior to any publication by McGowan on the subject. Under habitat, no mention is made that this organism has been found associated with numerous distemper-like affections of other animals by various investigators.

One of the most astonishing bits of information in the book is found in the key to the species of the genus *Pasteurella*. Here is what bacteriologists have been trying to find for many years, a means of differentiating the members of this most interesting group. We note that the growth in milk and on potato serves to distinguish the bovine, porcine and lepine from the avian and rodent organisms. While this is good news, we hesitate to recommend it as a safe basis for differentiation.

The book represents a vast amount of work, but as is so often the case with first editions, it is replete with inaccuracies, which will undoubtedly be corrected in future editions. The value of the book will be materially enhanced thereby.

ABSTRACTS

AN INFECTIOUS OPHTHALMIA OF CATTLE. F. S. Jones and Ralph B. Little. Jour. Exp. Med. XXXVIII (1923), 2, p.139.

The authors made a bacteriological study of twenty-four cases of infectious ophthalmia which occurred in a dairy herd. A diplobacillus was isolated from every case. The morphology and cultural characteristics of this organism are so similar to the Morax and Axenfeld diplobacillus, which is the cause of human pink-eye, that the two may prove to be identical. Zinc sulphate is apparently a specific in the treatment of infections with the human and bovine diplobacillus. A 1-40 solution of zinc sulphate was employed. The disease was reproduced experimentally with the diplobacillus. The authors have tersely summarized their observations as follows:

"Twenty-four cases of an acute ophthalmia of cattle have been observed. The infection is characterized by photophobia, severe congestion of the vessels of the eyeball, conjunctivitis, congestion and edema of the membrana nictitans, edema of the eyelids, accompanied by a thick, yellowish-white, mucous or mucopurulent exudate. In certain cases corneal ulcers and extensive corneal opacities developed. From all cases a characteristic diplobacillus was obtained. The organism was usually observed in the exudate in large numbers. The morphology, the hemolytic properties and the proteolytic activities readily assist in its identification. Instillation of a few drops of bouillon suspension of pure cultures beneath the eyelids on normal cattle gave rise to characteristic inflammations. The organism is not pathogenic for laboratory animals.

F. B.

- A COLLECTION OF NEMATODE PARASITES FROM ZANZIBAR.
C. L. Boulenger. *Parasitology* (Cambridge, Eng.), xv (1923)
2, pp. 113-121, text figs. 1-5.

The worms reported are from both domesticated and wild animals. Those reported from domesticated animals include *Belascaris cati* from the cat, *Belascaris marginata* from the dog, *Oxyuris equi* from the donkey, *Ascaridia lineata* from the chicken, *Strongylus vulgaris* and *S. edentatus* from the donkey, *Oesophagostomum columbianum* from sheep and goats, *O. dentatum* from the pig, *Haemonchus contortus* from sheep, *Physaloptera praeputialis* from the cat, *Setaria equina* from the donkey, *Setaria labiatopapillosa* from the ox, and *Trichuris ovis* from the sheep. *Ascaridia hamia* Lane, 1914, is regarded as a synonym of *A. lineata*. *Physaloptera praeputialis* is redescribed and figured. The specimen of *Setaria labiatopapillosa* is labelled by the collector as from the "heart of ox."

M. C. H.

- BACILLARY DYSENTERY IN LAMBS. A NOTE ON SOME RECENT
RESEARCH INTO THE ETIOLOGY AND SOURCE OF INFECTION.
Gaiger, S. H. and Dalling, T. *Jour. Comp. Path. and Thera.*
xxxvi (1923), p. 120.

The article is a continuation of the studies published in 1921. At that time they believed that lamb dysentery was due to an organism of the *B. coli* type. More complete studies have led them to conclude that two organisms are responsible, *B. coli* and an anaerobe of the *B. welchii* type. They state that infection takes place by ingestion during or after birth. The soil becomes contaminated and harbors the organism from year to year.

F. S. J.

- SOME POINTS RELATING TO THE MORPHOLOGY AND DEVELOPMENT OF SARCOCYSTIS TENELLA. J. P. McGowan. *Parasitology* (Cambridge, Eng.), xv (1923), 2, pp. 139-150, text figs. 1-2.

A disease affecting sheep in Scotland and known as scrapie, characterized by itching and paresis, is regarded as due to a heavy infection with *Sarcocystis tenella*, probably of increased virulence. The parasite is said to be transmitted from sheep to sheep by intrauterine infection and by means of the milk.

M. C. H.

AMERICAN VETERINARY MEDICAL ASSOCIATION
Proceedings of Sixtieth Annual Meeting, Montreal,
Canada. August 27 to 31, 1923.

(Continued from p. 111, October Journal)

MONDAY AFTERNOON, August 27, 1923

The meeting convened at 3:00 p. m., President Welch presiding.

PRESIDENT WELCH: The first thing on the program is a report from the Executive Board

. . . Secretary Hoskins read the report.

DR. MAYO: In considering the Executive Board report, I believe it would save time if we act upon the different sections of the report as they are presented.

SECRETARY HOSKINS: The first recommendation that requires action by the Association is one relative to donating JOURNALS to the War Memorial Library of the Royal College of Veterinary Surgeons, London, to enable them to complete their files. The Executive Board recommends that the Association donate copies of the JOURNAL as far as our reserve files will permit.

DR. MAYO: I move that the Association approve the recommendation of the Executive Board.

. . . The motion was seconded and carried.

SECRETARY HOSKINS: The next item is in regards to our Relief Fund. I might say that \$200 has been paid, during the past year, from our Relief Fund, to Dr. B. M. Goodman, and a recent communication indicates that Dr. Goodman is in need of further assistance. It was voted, on motion of Dr. Munce, seconded by Dr. Hilton, that this matter be referred to Dr. Way, who is a member of the Budget Committee, and to work it out with the Budget Committee.

It was not felt, by the members of the Executive Board, that we are proceeding along safe lines in continuing to give relief from this fund, for fear that the wrong interpretation may be placed upon the purpose of the fund or upon the functions of the Association.

DR. MAYO: Mr. President, in this connection, is this recommendation or action open for discussion?

SECRETARY HOSKINS: There is no recommendation, but I believe it is in perfect order for the matter to be discussed.

DR. MAYO: In previous years, by action of the Association and Executive Board, the President and Secretary were made the Committee to distribute what relief was deemed necessary and I still believe that that matter should be handled through the President and Secretary, with the Treasurer or any others, who may be interested, but the point I wanted to make is that the President and Secretary are already authorized to consider these applications.

SECRETARY HOSKINS: I might say that we have made no change in that policy and Dr. Welch and I have continued to function as the custodians of this fund. We have drawn the vouchers on this fund and they have been honored by Treasurer Jacob, but the point is this: This fund is rapidly being depleted, and at the present time, there is absolutely nothing being done to replenish the fund or even to keep it up to a certain amount.

The second point is that it is the belief of a number of the officers of our Association that no impression should get out that our Association is in any way a beneficial organization, and that is the reason it was deemed advisable to proceed with caution, with regard to any further withdrawals from this fund.

DR. MAYO: Mr. President, I would just like to say another word. This fund, as most of you know, was started during the war, and it was started with the object of giving immediate and only temporary assistance to veterinarians or their families who were in temporary need. It was not started, so far as I recall, with the object of providing a permanent relief fund that should continue for any particular length of time or any indefinite length of time, but only to just tide over an immediate emergency. I also believe that before the Association should adopt a plan of continuing relief for years, to any individual, it should be brought before the Association, and the Association decide what action should be taken.

PRESIDENT WELCH: Do you want to act on that at the present time? What is your pleasure?

DR. MAYO: In order to get an expression of opinion, I move that the Relief Fund of the American Veterinary Medical Association shall be for the sole object of affording temporary relief for members, or their families, who may be in need.

. . . The motion was seconded. . . .

PRESIDENT WELCH: Gentlemen, you have heard the motion. Is there any discussion on the subject? I will ask Dr. Hoskins to explain this Goodman matter.

SECRETARY HOSKINS: Dr. B. M. Goodman is a veterinarian in the employ of the Bureau of Animal Industry. He is on the force at Cincinnati, Ohio. A little over a year ago he was taken seriously ill with diabetes. His savings were very rapidly exhausted and he was in dire need of financial assistance. A communication was addressed to the Association, asking for some financial assistance. After considerable correspondence and thorough investigation of the worthiness of the case, the President and the Secretary agreed that Dr. Goodman should be given one hundred dollars from our Relief Fund, which was done. A very nice letter of appreciation was received.

We kept track of the case and a very short time after that, Dr. Goodman was placed on insulin treatment. He responded very nicely and was thought to be on the road to recovery. He had a setback and a second request from the same source, through the same channels, was made upon our Association, or our Relief Fund, for further assistance, which was granted.

This third request was received just a very short time ago, and is practically the same sort of a request as the first and second. Dr. Goodman is not doing very well; some complications have set in, and he is in very sad circumstances.

There are twenty-seven hundred and some odd dollars in the fund, and we have withdrawn \$200 during the past year and transmitted it to Dr. Goodman.

The third request, which is now on file, has not been acted upon, and that is the one now under discussion.

DR. MUNCE: As a member of the Executive Board, I would like to make known the following facts which confronted the Executive Board.

This fund was created primarily to take care of an emergency situation during the war. Since the war, as you all know, conditions have changed. Now, this is the situation: since the war has closed, there have been two cases provided for, from this fund, by the Executive Board, and as Dr. Hoskins says, the third application was presented yesterday.

The Executive Board, after careful consideration, felt that they should proceed cautiously in this matter of giving relief to members of the Association, or the families of deceased members, because we were establishing a precedent which might lead us into deep water and would be dangerous.

Therefore, we felt the matter should come before the Association for the purpose of having a definite policy established by

the Association, along the line of giving relief to needy members or their families. This is the purpose of presenting it at this time.

DR. MAYO: Mr. President, I am not discussing the merits of this case which Dr. Hoskins presented; I am discussing only the question of policy that the Association should follow. I believe that unless the Association adopts some plan or method of establishing a permanent relief, insurance or whatever you may call it, the principal of this fund should remain unimpaired in the Association treasury.

I think the relief given in any year ought not to exceed the income from this fund; that is, under the present circumstances.

Mr. President, I would like to make an amendment to the motion, that the sum expended in any one year shall not exceed the income received from this fund.

Seconded by Dr. H. W. Wilson.

PRESIDENT WELCH: As many as are in favor of the amendment say "aye"; opposed, "no." The amendment is carried.

Secretary Hoskins then read, in the Executive Board report, the paragraph relating to Dr. Wm. C. Woodward's several letters, requesting that the American Veterinary Medical Association work with the American Medical Association on certain legislation.

SECRETARY HOSKINS: Just a word about the nature of these communications, from Dr. Woodward, who is Executive Secretary of the Bureau of Legal Medicine and Legislation of the American Medical Association. One of them is that under the present rulings of the proper authorities, physicians, veterinarians and other professional men are not allowed to make deductions in their income tax reports for any expenses entailed in attendance at meetings, a convention of this kind, for instance, or in pursuing post-graduate courses, and it is the thought that these expenditures are legitimate expenditures, made in a business way, and should be deductible.

The second communication favored a reduction in the present narcotic license fee, from three dollars to one.

The third communication was soliciting the support of this Association for the protection of medical research, with particular regard to humane measures and vivisection questions. The communication from Dr. J. P. Turner, which is closely allied, being of a legislative nature, is that at the present time it appears to be absolutely ridiculous for veterinarians to be limited to two gallons of alcohol a year, when the same amount is allowed to

dentists, and the only use that a dentist ever has for alcohol is in annealing gold, and it is believed that veterinarians could legitimately use a considerably larger amount than the present allotment. There is no recommendation.

Secretary Hoskins reported that a communication had been received, inviting the American Veterinary Medical Association to send a representative to the Centenary Anniversary of the Royal (Dick) Veterinary College, Edinburgh. The Executive Board recommended to the Association that Dr. W. H. Wray be appointed our official delegate to represent the Association at the celebration November 27th and 28th, 1923. The Secretary reported that Dr. Wray had been a member of the Association for forty-five years, and was at present located in England, and that it was believed that he was the logical person to act in the capacity of our representative at the centenary celebration.

DR. GEORGE H. BERNS: If I am not mistaken, I think I saw in a paper not long ago that Dr. Wray had passed away.

DR. JOHN R. MOHLER: Mr. President, I want to ask if any provision has been made for the payment of Dr. Wray's expenses by this Association?

SECRETARY HOSKINS: Dr. Berns reports that the Brooklyn papers recently contained a notice of the death of Dr. Wray. Can anyone vouch for the correctness of this report?

DR. CHAS. H. HIGGINS: The death notice was in the New York papers last Wednesday or Thursday.

DR. N. S. MAYO: I am in favor of having a representative at that meeting if we can do so without too much expense, and if we have a member in England who is available to represent this Association at the meeting, I should be very glad to make a motion that this Association pay the expenses of such member to attend this meeting as a representative of this Association.

The motion was seconded by Dr. Kinsley.

DR. MAYO: I wish it to be understood that we will not pay the expenses of a member from this country, but of a member who may be in England at the time.

DR. MOHLER: Does the motion carry the name of Dr. Wray? Dr. Tuck, of New Orleans, has been ordered to go to London. Dr. Wray is almost seventy years of age. He goes on the retirement list in January 1924. The Bureau has provided to have Dr. Tuck in London in time to get some instructions, so I would prefer not to have any name mentioned. In case Dr. Tuck is

there, he can attend the meeting as a representative of this Association.

President Welch then put the motion, which was carried.

The next order of business was the admission of new members. The Secretary read the list of applicants who had been approved by the Executive Board. (The complete list of new members admitted at this meeting will be published in another part of the proceedings.)

PRESIDENT WELCH: Gentlemen, these applications have been approved by the Executive Board. What is your pleasure? A motion to elect them to membership will be in order.

DR. MAYO: I move that the names read be elected to membership, and the Secretary instructed to cast the ballot of the Association for those whose names were read.

The motion was seconded and carried. Secretary Hoskins cast the ballot, as instructed, and the applicants were declared elected to membership.

SECRETARY HOSKINS: There are several applications that will have to be taken care of by special action. We have four applicants who are graduates of the United States College of Veterinary Surgeons, in Washington, D. C. This college was not recognized at the time that these four applicants graduated. The applicants have been out of college five years, but we are informed that the college is still continuing to graduate veterinarians not in conformity with the requirements of this Association. The Executive Board, therefore, recommends that these four applicants be not accepted.

DR. MAYO: I move that the action of the Executive Board be approved.

The motion was seconded and carried.

SECRETARY HOSKINS: We have one applicant who is a graduate of the Arkansas Veterinary College. The Executive Board recommends that this applicant be not accepted.

DR. T. H. FERGUSON: I move that the action of the Executive Board be approved.

The motion was seconded and carried.

SECRETARY HOSKINS: We have the application of Dr. George R. White, of Nashville, Tennessee, held over from last year. This application was presented last year, and some question was raised concerning the applicant, who was requested to appear before the Executive Board and make his application in person. Dr. White failed to appear last year, and has not appeared this

year, hence the action recommended; namely, that this application be not accepted.

DR. J. T. HERNESHEIM: I move that the action of the Executive Board be approved.

The motion was seconded and carried.

SECRETARY HOSKINS: We have two applicants, Dr. T. F. Lane, of Ann Arbor, Michigan, and Dr. J. F. McGhee, of Chamberlain, South Dakota, both graduates of the Western Veterinary College. The Executive Board recommends that these two applicants be accepted under a suspension of the by-laws. The reason for this action is that the Western Veterinary College was not approved by this Association. It is no longer in existence, and these two applicants come to us extremely well recommended. I personally am acquainted with Dr. Lane and can recommend him without reservation. I have letters on file relative to the other applicant, Dr. McGhee, and as far as it is possible to learn, he is a veterinarian in good professional standing in his state. The Association has already adopted the precedent of admitting graduates of this institution, on a number of occasions in the past. Dr. Lane is a member of the Michigan State Veterinary Medical Association, and I believe I am correct in saying that Dr. McGhee is a member of his State Association.

DR. KINSLEY: Mr. President, a question of information. Each of the members, as I recall it, who were elected from the Western Veterinary College, was elected on personal recommendation. What is the difference between these men and the one from the Arkansas Veterinary College?

SECRETARY HOSKINS: The only difference, so far as I know, is that the precedent has already been established in the case of the Western Veterinary College.

DR. KINSLEY: I would like to know if there are any personal recommendations for the gentleman from Arkansas. Who turned in his application?

SECRETARY HOSKINS: I did. I attended the annual meeting of the Arkansas Veterinary Association, in Little Rock, on June 9th. While there, I became acquainted with Dr. Noffsinger, who subsequently filed his application at my earnest solicitation. At the time that I approached him on the subject I believed that it would be possible for him to be admitted to membership under Section 3 of Article 2 of the by-laws, which provides that veterinarians who are graduates of institutions that were not recognized by this Association at the time of their graduation,

after a lapse of five years, may be admitted to membership in this Association provided that the institution in question has ceased to graduate veterinarians in violation of our requirements, and I believed at the time that I solicited this man to put in his application, that he could be taken in under that clause in the by-laws.

I personally investigated the standing of this man. He is one of those exceptional individuals who would undoubtedly have been a good man no matter where he went to college. He was just unfortunate enough to have connected himself with the institution in question. He enjoys a very lucrative practice in his community; is a very highly respected citizen; is a member of his State Association; and his professional standing, as far as I could ascertain, is of the best. Dr. H. W. Wilson, our Resident Secretary for Arkansas, is in the room and if he cares to say anything concerning this application I dare say you will extend him that privilege.

DR. H. W. WILSON: In times past it has been customary, on a few occasions, where men were not graduates of schools recognized by this Association, to accept their applications and admit them to membership. I remember a case of that kind last year, and also the year before. This particular man is just as Dr. Hoskins says, one who, I believe, would be a credit to the Association, and it is pretty hard to tell where to draw the line. Personally I would recommend him.

DR. FERGUSON: It seems to me that we have here the cases of three different men who have proven to be good men in the profession, regardless of the fact that they selected poor schools to attend. They have all been out in practice five years or more, and they come well recommended. I believe we would be wise in giving their cases favorable consideration.

DR. KINSLEY: I move that we approve the recommendation of the Executive Board relative to the two applicants from the Western Veterinary College.

SECRETARY HOSKINS: The motion is to adopt the recommendation of the Executive Board and admit to membership in this Association, under suspension of the by-laws, Dr. T. F. Lane, of Ann Arbor, Michigan, and Dr. J. F. McGhee, of Chamberlain, South Dakota, graduates of the Western Veterinary College.

PRESIDENT WELCH: Gentlemen, this will require suspension of the by-laws.

DR. C. S. CHASE: I do not see how you can admit those from one school and not from the other. If you admit these two men you will have to admit the one from Arkansas as well.

DR. KINSLEY: It was my idea to ask for a reconsideration of the other motion. We will have to dispose of the one that is before us first.

President Welch put the motion to elect the two applicants from the Western Veterinary College, which was carried.

DR. KINSLEY: Mr. President, I move that we reconsider the question of the applicant from Arkansas.

The motion to reconsider was seconded and carried.

DR. KINSLEY: Mr. President, I move that the rules be suspended and the Secretary instructed to cast the ballot of the Association in favor of the applicant from Arkansas, electing him to membership in this Association.

The motion was seconded and carried.

SECRETARY HOSKINS: We have several applications from veterinarians located in foreign countries. Among them are four applications from graduates of the veterinary college located in Cairo, Egypt. The Executive Board recommends that these applications be referred to the Committee on Intelligence and Education, for a recommendation. There is also an applicant from Cuba, Major Luis A. Beltran.

DR. MAYO: Mr. President, I move that the action of the Executive Board be approved and the Secretary instructed to cast the ballot of the Association for Major Beltran.

The motion was seconded and carried.

SECRETARY HOSKINS: We have an application from Mexico, that of Dr. Carlos Pavia E.

DR. MAYO: Mr. President, I know Dr. Pavia personally, and he is a very fine gentleman. I believe that in considering the name of a foreign veterinarian we should give it careful consideration from the standpoint of policy. I believe that this Association is destined to be, if it is not already, one of the greatest veterinary associations in the world. One of the things that I feel proud of in my career as a veterinarian is that I believe I was instrumental in getting the Association to adopt an official JOURNAL.

Now, our JOURNAL goes to veterinarians in other countries, and I believe that it is carrying the message of this Association to other countries, and I believe it should be the policy of this Association to extend its work, to make it international in char-

acter just as far as possible, and I also believe that this Association should endeavor to secure membership in other countries just as much as we can. I believe that it will redound to the prosperity, the usefulness and the efficiency of this Association. We have already accepted members from Mexico. I do not know but that we have more than one from the National Veterinary School, of Mexico. I believe that we should establish the policy of recognizing, as eligible to membership in this Association, graduates of state or national veterinary schools, particularly national veterinary schools of other countries, and I, therefore, am much in favor of the motion to elect Dr. Pavia to membership.

DR. BENNETT: I will sanction what Dr. Mayo has said. I have had the pleasure of meeting Dr. Pavia, in Mexico, and know him to be an honorable gentleman.

DR. KINSLEY: I move that the action of the Executive Board be approved.

The motion was seconded.

PRESIDENT WELCH: You have heard the motion, that the report of the Executive Board be approved, and that Dr. Pavia be elected to membership.

. . . The motion was carried. . . .

SECRETARY HOSKINS: That disposes of the irregular cases.

DR. MAYO: How about those applications from Egypt?

SECRETARY HOSKINS: There are five altogether. One of the five is a graduate of the Royal College of Veterinary Surgeons and was not questioned. The other four are graduates of the Cairo Veterinary College, and they have been referred to the Committee on Intelligence and Education for further enlightenment, as it was the belief of the members of the Executive Board that the Committee on Intelligence and Education had received instructions to make some investigation and study of foreign colleges whose graduates we might accept at any time that they sought admission to this Association.

DR. MAYO: I would like to ask another question. Who sent in these names from Egypt?

SECRETARY HOSKINS: The names were sent in by the Resident Secretary of Egypt. The Resident Secretary of Egypt is a member of this Association and was accepted as a member of this Association as a citizen of Egypt.

DR. MAYO: Do you know of what school he is a graduate?

SECRETARY HOSKINS: He is a graduate of the Ontario Veterinary College.

DR. MAYO: Mr. President, I think the Secretary is wrong with reference to the Committee on Intelligence and Education. The Secretary of the Association was instructed, a couple of years ago, to collect data in regard to these foreign veterinary schools, and I wrote to all that I could learn of, but there were a good many I didn't know about, and I confess my ignornace. The National Veterinary School, of Cairo, Egypt, was one, but I believe these men are entitled to membership in this Association. They have been proposed and recommended by a graduate of the Ontario Veterinary College, who is a resident of Egypt, and I believe a native of that country, and I move that the Secretary be instructed to cast the ballot of this Association in favor of those applicants from Egypt.

DR. CARY: The Constitution and By-laws makes no provision for Europeans, except as honorary members of this Association; or for Asiatics. I rise to a point of order, to object to the reception of these members, on the grounds that it is not constitutional.

SECRETARY HOSKINS: I perhaps am again to blame, to some extent, at least, for these applications from Egypt being presented. When it devolved upon the President to appoint his resident secretaries last fall, at his request, I submitted to him the names of members located in certain states, and with it I included a list of foreign countries, where we had members.

We had a member in China, and to the best of my knowledge he was accepted at the time that he was a citizen of China. We have members in quite a number of countries in South America. We accepted a member, at the meeting last year, from the Dominican Republic; we have members in Cuba; we have accepted members who were located in England at the time of their admission to this Association, and to me, it looked like splitting hairs to say that it was all right to admit a Chinaman and turn down an Egyptian; so I included the name of Dr. Aghion, as a possible resident Secretary for Egypt, along with the possible resident secretaries in other countries, where we had members in good standing.

I never expected that Dr. Aghion, who is the Egyptian Resident Secretary, would turn in any applications but lo and behold, one day I got a letter from Cairo that was plastered, front and back, with stamps, much to my delight, and on opening it, I

found a remittance for fifty dollars, covering these five applications for membership.

They were acknowledged in the usual way, and the applicants were told that their applications would be presented to this Association at this meeting; and I might say, as I told the Executive Board yesterday afternoon, I have been using this little incident as an argument in soliciting new members for our Association. I have told the men, in a number of states, that it was hard for me to understand how five men, away off in Egypt, could see sufficient value in paying their money to join our Association, when the chances are they would never get anything out of it except the JOURNAL, and yet we had between two and three thousand eligible veterinarians in this country who couldn't see the good of joining our Association.

DR. KINSLEY: I would like to ask Dr. Cary to read us from the Constitution. As I see it, "Members of this Association shall be of two kinds, active and honorary. Active members must be graduates of veterinary colleges approved by the Association and recommended by the Executive Board and elected to membership in accordance with the by-laws."

DR. CARY: Mr. Chairman, it is easily explained. Our very title says, "*American Veterinary Medical Association*." Does American mean Egypt, England, China, India? If I am wrong, you had better put that in the Constitution and By-laws.

DR. MAYO: Mr. President, after all, it is just a question of name. We have members in Japan. We have quite a good many members in the Philippines, in England, in France, in Egypt, in Africa, and I confess that this is the first time that I have ever heard the question raised that no one could belong to this Association unless he happened to be located upon the Americas.

DR. CARY: As long as there has been a violation of the Constitution and By-laws, there is no reason why we should continue.

DR. MAYO: We haven't violated the Constitution and By-laws. It provides that we can elect members in certain ways and doesn't say from what country they shall come.

DR. MURPHEY: I want to relate one instance. The American Association of Anatomists publishes a journal. The Secretary sent this publication to all parts of the globe. He solicited private contributions to do this. The result was a great increase in the prestige of the American Association of Anatomists in the eyes of the anatomists of the world.

I know that while Dr. Mohler was Editor of this Association, he followed a very similar policy, in sending the official JOURNAL of this Association to all corners of the globe, and I am sure that that added prestige. I am sure that taking in these members, even stepping over technicalities in the constitution, would add prestige to the Association. It is an honor to us to accept those applicants from foreign countries.

PRESIDENT WELCH: I will say, gentlemen, I think there is no ground for questioning any individual in any part of the world, who desires to become a member of the Association.

DR. B. T. SIMMS: I feel that we are making a mistake when we admit any man to our Association unless we know something of the qualifications, regardless of whether he lives in Timbuctoo or in Montreal. We know nothing of this veterinary college from which these men are graduates. If we exclude our American citizens, because they have graduated from schools that have not been inspected and have not passed the requirements of our Association, it seems to me we should not admit foreigners until they have come up to our requirements and qualifications.

For that reason I am very much opposed to admitting any man to our Association who has graduated from some school concerning which we have no information. Our former Secretary admits he had not even heard of this school until it came before us just now. I think that is true of practically every man in this room. For all I know, that may be a correspondence school, and I dare say that will hold with ninety-nine per cent of them.

If we have requirements for American applicants, let's hold those same requirements up for foreigners, and until we know something of the school from which they come, I am very much opposed to admitting these men to membership in our Association.

DR. MAYO: Mr. President, I think that there is a very decided difference between those in this country who are in actual practice, and those in foreign countries who have graduated from recognized—I say recognized and I mean by that, official schools in those countries. In the first place it is a very difficult matter to compare our system of education and our curricula in the schools of this country with those of other countries. The environments are very different. Unfortunately, a good many of us from just south of the line have an opinion that there is nothing in the world like what we have in the States; no

veterinary schools in the world can compare with ours, we have the biggest, and so on.

Maybe that is a natural inference, but after all, I want to tell you, there are some good veterinary schools in the world besides what are in the United States, and there are some good men graduating from them, too.

This Association has recognized schools, foreign schools, that according to our standards it would be pretty hard to compare. There are a number here that know Dr. Aghion and know that he is a first class man. I would have no hesitation whatever in accepting his judgment in recommending these men for membership.

Unfortunately, the argument which the Doctor presented about recognition in the United States has been due to our own ignorance, and our own lack of organization in the States because we have veterinary schools all the way from a blacksmith shop up to a university, and we had to make some distinction. Other countries, I believe, are very far ahead of us in the question of veterinary education, and when they have established official veterinary schools in a country, it means that the school meets the requirements of that country, and I believe we should not be so provincial as to measure everything by what we happen to have in the United States. (Applause).

PRESIDENT WELCH: You have heard the motion that these veterinarians be elected to membership.

. . . The motion was carried. . . .

SECRETARY HOSKINS: I hereby cast the ballot of the Association for all of these veterinarians whose applications have been given special consideration, in conformity with your several instructions.

PRESIDENT WELCH: Gentlemen, I have just received the following telegram:

"President Congres Veterinaires,

Mount Royal Hotel, Montreal, Que.

Mon premier soin debarquant New York est vous prier presenter cordial salut representant France a tous nos confreres.

Professor Porcher Delton."

(Translation)

"Veterinary Convention,

Mount Royal Hotel, Montreal:

My first thought upon disembarking in New York is to present cordial greetings from France to all our confreres.

Professor Porcher."

(Applause.)

We will now hear the report of the Secretary-Editor.

. . . Secretary Hoskins presented his prepared report.

. . . (Applause.)

PRESIDENT WELCH: Gentlemen, you have heard the report of the Secretary-Editor. What is your pleasure?

. . . It was voted, on motion of Dr. Mayo, duly seconded, that the report be accepted and referred to the Executive Board.

. . . (The report of the Secretary-Editor will be published in the December JOURNAL).

PRESIDENT WELCH: The report of the Treasurer?

TREASURER JACOB: Mr. President, and Gentlemen: As has been the custom in the past the report covering our finances has been prepared in pamphlet form. I have distributed this among you, and it gives in detail all the information pertaining to the office.

If there are any of you here who have not a copy of it, and desire to have one, let your wants be known and you will be supplied with it.

I might state in this connection that I consider our financial status at the present time as being very healthy, from a comparative standpoint, I should say. At the end of the fiscal year we had practically as much money as we had at the end of the previous fiscal year, and this in spite of the fact that there has been a change in the Editor and the Secretary, and the changing of the office, in that connection has always been a very expensive proposition, but as I say, in spite of that, we have got practically as much money as we had last year.

PRESIDENT WELCH: What shall be done with this report?

DR. MAYO: I move it be accepted and referred to the Executive Board.

. . . The motion was seconded and carried. . . .

SECRETARY HOSKINS: Mr. Chairman, I have here two rather short reports that are listed to be presented later in the meeting, and it is always a good thing to save time, if that can be done.

I am wondering if you would care to have presented at this time a very brief report of the Committee on History and the report of the Committee on Anatomical Nomenclature.

DR. KINSLEY: I move that the Secretary read these reports at this time.

. . . The motion was seconded and carried. . . .

. . . Secretary Hoskins read the report of the Committee on History.

. . . It was voted, on motion of Dr. Kinsley, seconded by Dr. Mayo, that the report of the Committee on History be received, and the Committee continued.

. . . Secretary Hoskins then read the report of the Committee on Anatomical Nomenclature.

. . . It was voted, on motion of Dr. Mayo, seconded by Dr. Kinsley, that this splendid report be received.

DR. MERILLAT: It seems to me that there is a reflection on the past officers of this Association in this report. I hope it isn't written into the records of this body. I can't recall where any officer of this Association ever was accused of being dilatory in his duties, and I don't think it is proper for us to let this go on record.

PRESIDENT WELCH: It is moved and seconded that this report be received.

DR. MERILLAT: I would amend that motion to refer this back to the Executive Board.

. . . The amendment was seconded. . . .

DR. MAYO: While the Chairman of the Committee did not mention my name, he might just as well have done so, and I wouldn't have taken any offense at it whatever. This matter of the report of the Committee has been presented to the Association by myself. I repeatedly did so, but the Committee was not really ready to report. They say this is their final report. It has been hanging fire for a number of years.

This report consists of a very long list,—pages,— of purely anatomical names, and some of us felt that it would be better rather than to publish in the JOURNAL page after page of these anatomical names, to wait until the final report was completed (and they have done a great deal of splendid work in this connection; I am not criticizing the Committee in any way because I think they have done a splendid work), with the idea of having this published as a separate publication, as a report of this Com-

mittee, published by this Association for distribution to those who are interested in this subject.

I believe it will be a matter of economy for the Association and also very desirable from the point of view of the Editor of the JOURNAL, because I feel that a great many members (particularly the practitioners) wouldn't be interested in having the JOURNAL taken up, month after month, or a considerable portion of it, with this long list of scientific names.

I think that this report should be published and in sufficient number so that any one who was interested in any way could procure a copy of this report which is now completed.

DR. MERILLAT: In further explanation of my amendment, I want to explain my position in this matter. During my tenure of office, during 1916-1917 (Dr. Day, by the way, finished out the last half of my period), this same question came up, and each demand to have this printed included a confession that it was not complete, and the recommendations that I made to the Association were to postpone the publication of this until it was complete. The cost of putting into type an incomplete report was not proper.

There never was, during my tenure of office, any objection to publication. The postponement was purely a confession on the part of the Committee that the report was not complete and could not serve a useful purpose, and I don't believe, therefore, that the Committee should charge the officers of this Association with having been opposed to their work. I don't believe it is a fact, and consequently, I would hate to see that written into the records of this Association.

SECRETARY HOSKINS: I might be able to clear the atmosphere a little bit on this point. I think really the only objection that Dr. Sisson had, or the only grievance, was that at various times in the past there had been exorbitant estimates made on the probable cost of publishing this report, and he took it upon himself to solicit bids from printing houses to see just exactly what it would cost, and the report has been printed at an expense of just a little less than two hundred dollars. It is expected that that entire amount will come back into our treasury through the sale of copies of this report at two dollars and fifty cents apiece, and I would like to take this opportunity of extending an invitation to about two hundred members to buy a copy of that report. There are only two hundred copies, and when they are gone, there won't be any more.

DR. H. S. MURPHEY: After, I think, about the third committee was organized, I was made a member of it, and I know something of the history after that. I also know the original history of the grievance that Dr. Sisson has. To give you the history briefly: The recommendation that we have a committee was passed at the Toronto meeting, and Professor Sisson, Dr. Stewart and Dr. Newsom were the original committee.

At the next meeting, in Indianapolis, there was considerable controversy. I defended the position of the committee on the idea of a uniform nomenclature with a Latin basis, and it was accepted. That was written in their report.

Their next report consisted of a large number of terms presented to the New York meeting; the report was accepted and published in book form, and I believe that was the last year that the Association published it in book form, in 1913. At that meeting the question of funds to publish all of these terms together was brought up, and personally we made the motion that the funds be allowed, and that was done at that time.

When the preliminary report was presented, the officers of this Association (I don't know who they were) refused to publish this report, or allow Dr. Sisson any money. He never got over it.

I belong to the committee, but I am in the same boat as the committee, due to this antagonistic spirit that was manifest. Even though we have kept on going, I have taken no part in the work of the committee. I am in the same boat as was the kid who was asked, "Does your father belong to church?"

"Yep, but he ain't workin' at it just now." (Laughter).

This is a very satisfactory set of terms. It means the making of progress, but if those persons who know the status, will think, they will know that a few years ago a committee was appointed from the American Association of Anatomists, cooperating with the committee from the British Association of Anatomists, with the expectation of overhauling the B. N. A. set of terms, getting a uniform set in, namely, human, comparative and veterinary anatomy, and the conditions were such in Europe that it was decided that the best thing to do was to wait a long time.

To be perfectly blunt, it was to wait until both the German peoples and the French peoples were in condition to cooperate, and one of the serious stumbling blocks was the fact that in the previous attempts of this kind to get a uniform nomenclature, the French people had not given any cooperation. It was hoped when the thing was finally done it would be on a Latin basis that

would serve as a basis of anatomy for all parts of the world. I hope this will be a step in that direction.

As a member of that committee, knowing all that, I forgot it when it was time to forget, and I tried to continue to forget it, and I am sorry that part of it is included because bickerings won't get us anywhere. We need to work together.

DR. MAYO: I want to say so far as I was personally concerned, there was no opposition whatever. The matter was presented to an Executive Board of the Association, as fairly as I could present it, and the action taken in the past was entirely by the Executive Board of this Association. I was not a member but if I was to blame in any way, it is my trouble.

DR. MURPHEY: I didn't make myself clear on one thing. There were sufficient funds provided by a motion that was passed on the floor and made a matter of record, at the New York meeting, and those persons who want to verify that can go back to the records of the 1913 meeting, and they will find that money was definitely appropriated by the Association and some of the officers refused to give that money in accordance with the action of the Association.

As a matter of fact, the thing Professor Sisson didn't like was the fact that the Association granted this, and the officers refused to grant it. I would like to see this go to the Executive Board and the bristles taken off before it is published.

DR. MERILLAT: At a meeting of the Executive Board at Kansas City, in 1916, there was presented to the Board some correspondence with Professor Sisson covering this point, and the Board decided at that meeting that in view of the fact that the report was not complete they would not appropriate any money for its publication.

That is a part of the record of the meeting of the Executive Board in the meeting at the Kansas City Veterinary College, and should be on the records of the Association. The Board never took any opposite action; never belittled the committee, but the letters that were read inferred constantly that the Association was belittling the committee, something which was never thought of. It was simply incomplete work that they were waiting to publish at the proper time.

PRESIDENT WELCH: The original motion was that the report be received, and the amendment was that it be referred to the Executive Board.

The question is on the amendment that this be referred to the Executive Board.

. . . The amendment was carried. . . .

PRESIDENT WELCH: The original motion, as amended, is that this be received and referred to the Executive Board.

. . . The motion, as amended, was carried. . . .

PRESIDENT WELCH: Is there anything under the head of new business that you wish to present at this time? If not, we will adjourn.

ADJOURNMENT

(To be continued)

SIDELIGHTS ON THE MONTREAL MEETING

Members registered	364
Ladies registered	233
Gentlemen visitors	139
Total registration	736
Estimated attendance	800
New members admitted	198
States represented	36
Provinces represented	8
Veterinary colleges represented	11

DR. DAMMAN IN A NEW POSITION

Dr. A. J. Damman, past-president of the British Columbia Veterinary Association has been appointed Travelling Milk Inspector by the Fraser Valley Milk Producers Association, a cooperative milk producing and retail distributing association of British Columbia dairymen, supplying milk to the cities of Vancouver and New Westminster, B. C.

Dr. Damman's duties consist of adjusting disputes, as to cream and milk tests, between the farm producer and his management, as well as other troubles; also endeavoring to instruct the dairyman how to produce a cleaner quality of milk, so as to eliminate eventually the necessity for, and the cost of, pasteurization, which will bring more profit to the dairyman without increasing the cost to the consumer.

STATE BOARD EXAMINATION

Arkansas State Board of Veterinary Examiners. Little Rock, Ark. Nov. 30, 1923. Dr. Joe H. Bux, Secretary, Little Rock, Ark.

OTHER MEETINGS

GEORGIA STATE VETERINARY ASSOCIATION

The seventeenth annual meeting of the Georgia State Veterinary Association, held in Savannah, September 19-20, 1923, was perhaps one of the most enjoyable occasions in the history of the Association. This was not a mere "cut-and-dried" technical and professional meeting, but one which was both professional and social. An invitation was sent to all veterinarians in Georgia to meet at Savannah, in company with their wives or sweethearts, and there enjoy the hospitality of that historic and interesting sea-port city. In response to this invitation, quite a number of the members brought their ladies with them.

The meeting was held at the Savannah Hotel, and was opened by addresses of welcome on behalf of both the City of Savannah and the Savannah Board of Trade. Honorable W. G. Sutlive, editor of the *Savannah Press*, and State Representative from Chatham County, complimented the veterinary profession upon the work that it is doing toward the preservation of human life through the prevention and control of diseases in live stock, which are communicable to man. Mr. Sutlive opened the gates of the City of Savannah to the Association, and extended us a most cordial welcome. Honorable Mr. Moses, representing the Savannah Board of Trade, welcomed us in his humorous way, and offered the services of the Board of Trade to all in attendance at the meeting. These addresses of welcome threw a double burden upon the member chosen to make the response, but in a short but well delivered talk, Dr. E. D. King, Jr., City Milk and Meat Inspector of Valdosta, voiced the sentiments of the Association.

In the President's address, Dr. A. G. G. Richardson, Dean of the Division of Veterinary Medicine, University of Georgia, featured a review of changes which have taken place in the past two decades. Quoting statistics, he pointed out that, although the loss in equine practice has been marked, the opening up of new avenues of professional revenue have more than offset the loss in equine practice. He urged the veterinarian to take an active part in the program of agricultural diversifica-

tion, which, when well balanced, must include a progressive and profitable animal industry.

The paper on "Veterinary Officers' Reserve Corp, Army of the United States," by Dr. Henry A. Jasme, of Savannah, was well received, and heartily endorsed by Dr. E. D. King, Jr., who led the discussion. Drs. Jasme and King brought out the point that the enlistment in the Reserve Corp would not only benefit the veterinarian from the military training standpoint, but, in the event of hostilities, a Reserve Officer would be rapidly advanced to the higher ranks of his division, instead of having to enlist as a private, as was the case in many instances during the late war.

Dr. W. A. Scott, of Columbus, presented the subject of "Differential Diagnosis between Parturient Eclampsia, in the Bitch, and Strychnine Poisoning." Dr. Scott showed that all cases which present symptoms of spasm should be carefully studied as to history, and recent parturition should be taken into consideration. This paper brought out considerable discussion by the practitioners present, who gave reports of like cases seen in their practices, and the results of various lines of treatment.

Dr. W. E. White, of Tifton, read a paper on "The Effect of State and Federal Disease Control Work on the Practitioner." In his paper, Dr. White showed that were it not for the initiative taken by the State and Federal Governments, in the putting on of campaigns for the control of diseases and the enforcement of certain control measures, by the governments, that the control and eradication of contagious diseases would be in its infancy today. In other words, if the general public had to wait until control measures were promulgated by the practitioner, there would be but little contagious disease control work being done. On the other hand, he pointed out that very little could have been done, if those in authority had not the cooperation of the general practitioner. After all, the veterinary profession is working with one point in view, i. e., the preservation of animal life and consequent saving of human life; so there should be no line of demarcation between the actual practitioner and those engaged in other lines within the army of the veterinary profession. This paper was creditably discussed by Dr. J. E. Severin, of Athens.

Dr. A. L. Hirleman, U. S. Inspector in Charge of Tuberculosis Eradication Work in Georgia, next gave a chart talk on "Experi-

ences in the Eradication of Tuberculosis in a Badly Infected Herd." The experiences covering the testing of this particular herd covered a period of about six years. It was shown that herds of cattle may acquire a tolerance to one-method of testing and that once a herd acquires this tolerance, it is sometimes impossible to rid it entirely of tuberculosis by one method testing. Dr. Hirleman showed that, by the triple combination test, fifty-one animals out of a herd of seventy-one head were tuberculous. It was shown by this triple combination test, that all cattle do not react to all three tests, but that some will react to all three, some to two tests of the combination, and some to one test only. Nine head in this particular herd reacted to the ophthalmic test only, and, upon post-mortem, well marked tubercular lesions were found. This paper brought out some interesting discussions and comments.

In the paper, "Some Experiences in the Use of Hog Cholera Serum and Virus," Dr. Harry Trumbo, Veterinary Inspector in Hog Cholera Control Work in Georgia, gave some interesting experiences in this work, and carried the use of serum in the immunization against cholera, almost from its inception to the present time. He brought out the point that good results in the use of serum and virus not only depend upon potent serum and virulent virus, but upon the care exercised by the operator in performing the work and the proper handling of the herds following vaccination. Dr. Trumbo also stressed the point of making a proper diagnosis of the disease before serum and virus are brought into use. This paper was discussed at length by Dr. W. B. Hirleman, Waynesboro; Dr. John W. Salter, Dawson; Dr. H. F. Hook, Statesboro, and other members of the Association, who brought out varying degrees of success following the use of serum and virus, and advanced various theories as to the cause of unusual results in the use of the simultaneous method of immunization.

The next paper, "When is a 'Used Cow' a Safe Buy?" by Dr. John W. Casey, Assistant State Veterinarian, McRae, Georgia, precipitated a lengthy discussion upon the question of the veterinarian qualifying himself as a good judge of cattle. This discussion was led by Dr. Bahnsen, who stressed the importance of the veterinarian being able to pass upon the merits of a cow, and thus make himself of value to the cattle buyer, and the general live stock interests of his community. He pointed out that the veterinarian should be in a position to

judge an animal, not only from a health point of view, but also from the standpoint of its intrinsic value in a dairy or breeding herd. This paper was also discussed by Dr. W. M. Burson, of Athens, Dr. Salter, of Dawson and Dr. R. M. Walsh, of Atlanta.

This concluded the program of the first day, and the members of the Association signed off until the following day.

The second day was one which will long be remembered by those present. About 8:30 a. m., the Association members and their ladies boarded the steamer "Clivedon" for a cruise down the historical Savannah River and through the winding streams and straits between the many islands at the mouth of this river. As we rode down the river, we passed old Fort Jackson, from which point the Savannah harbor and city were protected against possible attacks by the British during the War of 1812. This fort, built of brick, appeared to have withstood the ravages of the elements wonderfully well during the past century. There was noticed a moat surrounding this old fort, to protect it against land attacks, and a tunnel leading from the river into this moat, through which small craft could be pushed during low tide. Farther down the river the "Waving Girl" signaled the boat from the porch of her house, as has been her custom in the case of every boat passing into or out of Savannah for the past many years. At this point, Dr. W. P. Cox's field glasses became quite popular, but due to the trees along the shore, not many could see the smile on the face of the "Waving Girl." The river began to widen here, and we were soon steaming out past Tybee, that noted Georgia bathing resort—where Dr. Cox again became popular, and past the famous Tybee Light, and thence out onto the bounding high seas. The sea was quite calm and bounded but very little—only enough to thrill the passengers of the boat, as the slow, steady rolling of the craft took place. From this point, a large sea-going steamer was seen plowing its way to some more southern port.

After a short trip on the blue sea, the boat was turned into the channel toward Buck Island. In this channel we passed the white, red-topped light-houses on Daufuskie Island, passed numerous craft containing fishermen of crabs, shrimp and other sea foods, and finally were steered into one of the crookedest channels on the coast—Ram's Horn Creek. (The man who named this creek evidently raised Merino sheep.) Whole armies of fiddler crabs were seen along the banks of this channel. It was remarkable how these crabs knew just how far up the

bank to go, to get beyond the wash of the waves, as the boat went by them. Numerous islands are to be seen here, and on some of them small farms have been developed.

About this time the salt air had whetted the appetites of the passengers of the boat, and a raid was made on the bar, where beer—or what had once been beer, and shrimp were served. From then on, the bar-tender and his assistant were quite the most popular persons on board. The basket of shrimp soon looked like it had been well attended.

At noon the craft was tied up at the Picnic Grounds on Daufuskie Island, and all went ashore for more than an hour. Here we watched fishermen bring in boat loads of fish, crabs and shrimp. A mess of crabs was bought and cooked on the boat. To many this was their first experience with eating crab meat. It was on this island that a close watch had to be kept on Dr. W. C. (Bill) Stroud to keep him from wandering away, and getting lost, in his search for a "still." Dr. W. E. (Bill) White had his wife with him, so was well under control.

After returning to the boat, lunch, with beer, was served, cafeteria style, after which a short business meeting was held. At this meeting, Dr. J. M. Sutton, Sylvester, was chosen president for the coming year, with Dr. J. E. Severin, Athens, vice-president. Dr. Peter F. Bahnsen, Americus, was re-elected secretary-treasurer. Columbus and Atlanta contested for the next meeting place, and Columbus won by a large majority.

After the meeting, the boat was untied and headed for Savannah. The meeting this year was voted the "best ever," and Drs. W. A. Scott and B. N. Lauderdale, of Columbus, were instructed to get everything well primed for the meeting next year.

This was the first Association meeting at which ladies were in attendance, and it is hoped that, in the future, we may see them present each year, and in greater numbers.

PETER F. BAHNSEN, *Secretary.*

The Philadelphia Division of the United States Bureau of Animal Industry Veterinarians held their regular meeting at the University of Pennsylvania School of Veterinary Medicine, on October 9, 1923. Dr. Thomas Castor addressed the meeting on the subject of the Relation of the Lymphatic System to Meat Inspection.

SOUTHEASTERN MICHIGAN VETERINARY MEDICAL ASSOCIATION

The regular quarterly meeting of the Southeastern Michigan Veterinary Medical Association was held in Detroit, Michigan, Wednesday, October 3, 1923. There were forty-two members and visitors in attendance, President H. T. Carpenter presiding.

The program was opened with an address by Colonel O. G. Brown, Medical Instructor for the Michigan National Guard. He related the progress that had been made in the organization of a veterinary unit, and asked the veterinarians present to lend their assistance in completing the organization. Drs. Warren P. S. Hall and R. F. Blatchford, of Detroit, are the veterinarians attached to the unit.

Dr. Ward Giltner, of East Lansing, and Secretary-Editor Hoskins reported on various phases of the recent meeting of the A. V. M. A., in Montreal.

The literary program of the evening was offered by the Detroit branch of the Bureau of Animal Industry, and consisted of four very interesting papers bearing upon the subject of meat inspection. The first paper was presented by Dr. E. P. Schaffter, Inspector-in-Charge. His subject was "Tuberculosis of Bovines with Observations on the Avian Type in Swine," Dr. Schaffter reported that quite a few cases of tuberculosis encountered in the packing plants, in Detroit, were of the avian type, and that he believed it was possible to pick out lesions caused by the avian type of the tubercle bacillus with a little experience.

Dr. Joseph E. Zeltzer, presented "Post-Mortem Examination of Reacting Cattle." This paper related in a very systematic manner the various steps in a complete post-mortem examination of the carcass of a reactor.

"Parasites Infesting Meat-Producing Animals, Considered from a Sanitary Viewpoint" was the subject of a paper presented by Dr. H. L. Cotton, who brought out a number of very interesting points in connection with parasites which are sometimes found in food-producing animals. He paid particular attention to *Cysticercus cellulosae* and *Taenia solium*.

Dr. J. W. Vance presented a paper entitled "Stock-Yards Inspection and Regulations Governing Interstate Movement of Live Stock." This paper indicated that the author had a very comprehensive idea of the whys and wherefores of the present regulations.

Following the reading of the papers, there was an open discussion on the subject of "Municipal Meat and Milk Inspection," opened by Dr. H. H. Sparhawk, Chief Veterinarian of the Detroit Board of Health. Dr. Sparhawk announced that ordinances for the inspection of meat and milk were being considered by a large number of cities and towns throughout the State, and that it was the duty of every veterinarian to be posted on this subject, and to keep themselves in readiness to offer information on the subject when called upon.

State Veterinarian B. J. Killham endorsed the sentiments expressed by Dr. Sparhawk and offered additional evidence to indicate that the question was one to which every veterinarian should give his attention, even though it might necessitate some personal sacrifice for the time being. The suggestion was made that it might be a good plan to arrange for a conference in the near future and invite to it the proper officials in all of the cities and towns throughout the State which were considering some form of municipal food inspection. No definite action was taken.

H. PRESTON HOSKINS, *Secretary-Treasurer.*

DIXIE VETERINARY MEDICAL ASSOCIATION

The first annual meeting of the Dixie Veterinary Medical Association was held at Memphis, Tenn., in the Hotel Chisca, October 10th and 11th, 1923, Dr. Walter Martin, of Jonesboro, Ark., presiding. About seventy-five veterinarians were in attendance from Tennessee, Alabama, Mississippi, Louisiana, Arkansas, Missouri, Illinois, Kentucky, and several other states.

Following the invocation by Rev. C. C. Webdell, the Association was welcomed to Memphis by Mayor J. Rowlett Paine. Dr. E. I. Smith, of Nashville, Tenn., ably responded to the Mayor's address of welcome.

The literary program was opened with a paper by Dr. L. A. Merillat, of Chicago, Ill., entitled "The Therapeutics of 1923." In this paper the author reviewed the important progress that had been made in the field of therapeutics recently, and pointed out the more important of these for practical application by veterinarians. He paid special attention to the progress which has recently been made in the handling of diseases of breeding cattle and the treatment of animals infested with internal parasites. Dr. Merillat also referred to recent progress in the

field of surgery, citing a number of the newer operations, as well as improved methods of employing anesthetics.

Dr. W. B. Lincoln, State Veterinarian of Tennessee, made a brief address on the subject of control work in his State. It was quite apparent from what Dr. Lincoln said, that the practicing veterinarians of the State of Tennessee have nothing to fear in the way of encroachment upon their fields of practice by veterinarians in State employ.

After luncheon the members gathered in a circle around Dr. B. F. Kaupp, of Raleigh, N. C., who gave a splendid talk and demonstration on a fowl, including a complete autopsy, with a discussion of the various steps in the process of digestion, coupled with remarks on the diseases affecting the different organs of the alimentary tract. This proved to be one of the most instructive numbers on the program, and all of the veterinarians present exhibited a very deep interest in the subject, indicative of the growing importance of poultry practice everywhere.

Dr. J. V. Lacroix read a very fine paper on the subject of "Animal Hospital Management." Dr. Lacroix has had a great deal of experience in connection with his small animal hospital in Evanston, Ill., and gave the veterinarians present a large number of very valuable pointers in connection with diseases of small animals and how best to handle them. Dr. Lacroix mentioned a number of things, which, when done in the right spirit, should not be construed as violations of our code of ethics, as some might think, but as perfectly legitimate business-builders.

"Swamp Fever" was the subject of a paper presented by Dr. Wm. L. Gates, of Clarksdale, Miss. The writer is located in a district where there is a great deal of this infection, and it is a very serious problem for the veterinarians, as well as the owners of horses and mules in that territory. Dr. Gates reported apparent cures, following the administration of large doses of arsenicals, but in the discussion which followed, it was pointed out that cases of apparent recoveries may not be such in the true sense, but may be carriers of the virus, and highly dangerous as such. It was pointed out that it is just as important to know the correct dosage of the drug administered as it is to find a satisfactory medicinal agent. An insufficient dose of a highly efficient drug, in a disease such as swamp fever appears to be, may be productive of the carrier state in the animal treated and subsequent uselessness of the particular drug employed.

The evening program consisted of a number of very interesting moving picture films, exhibited by Dr. D. F. Luckey, Livestock Commissioner, National Stock Yards, East St. Louis, Ill., and two very lively boxing bouts by local talent.

The program Thursday morning was opened with a paper by Dr. J. P. O'Connor, of Nashville, Tenn., entitled "Field Experiences in Hog Cholera Control." This was followed by a splendid discussion, in which Drs. H. C. Curry and C. M. McFarland, of Kansas City, Mo., and Dr. A. C. Drach, of Omaha, Neb., took part. Dr. A. T. Kinsley, of Kansas City, Mo., then followed with a paper entitled "Something of Interest on Swine Diseases." In this paper Dr. Kinsley brought out the fact that the South was apparently not alive to the possibilities in the field of swine production, and he offered some very worthwhile suggestions as to how veterinarians might make themselves very useful in encouraging the raising of more swine in our southern states. Dr. Kinsley stated that the feeders throughout the corn belt would take all of the pigs that the South could produce, and that there was even now a practically continuous, ready market for them.

Dr. C. A. Cary, State Veterinarian of Alabama, addressed the meeting on the subject of "Sane State Regulations and Rules." Dr. Cary deplored the fact that greater progress has not been made in the eradication of hog cholera, in spite of the great amount of effort, time and money that has been expended in this direction. A very animated discussion followed.

Dr. H. Preston Hoskins, Secretary-Editor of the American Veterinary Medical Association, addressed the meeting on matters of interest in connection with the national association. He briefly reported on the transactions of the recent meeting in Montreal and plans for the coming year. He made a plea for the better support of the JOURNAL, especially by practitioners, and stated that it was the height of his ambition to see every eligible veterinarian in the country enrolled as a member of the Association. Having been approached by several of the local veterinarians concerning the possibility of getting the 1925 meeting for Memphis, he cautioned them against getting in the field for this meeting without a full realization of the responsibilities connected with entertaining such a large body. Dr. Hoskins briefly outlined the general plan of the program of annual meetings.

Following luncheon, the members were given a treat in the

form of two papers, by Dr. J. C. Flynn, of Kansas City, Mo. These dealt with the importance of small animal practice to the present-day veterinarian, and two diseases which have been giving the veterinarians in southern states considerable trouble of late, namely, so-called fright disease and black tongue. Dr. Flynn gave some very valuable pointers on handling a small animal practice, and related his experiences with the two diseases mentioned. One of the most interesting points brought out in his talk was the apparent relationship between a certain brand of commercial dog biscuits and so-called fright disease. He reported on having been successful in reproducing this disease in nine days by feeding dogs a certain brand of dog biscuit. The writer leaned to the belief that the disease is dietary in nature, for the reason that a change in diet invariably leads to recovery. A very enthusiastic discussion followed.

"Prophylactic Vaccine Against Rabies," was the subject of an address by Dr. Adolph Eichhorn, of Pearl River, N. Y., who briefly reviewed the history of vaccination against rabies, leading up to the recent development of the single-dose vaccine, now being used with such great success in the control of the disease among dogs, and incidentally saving the lives of a great many other animals as well as human beings. Dr. Eichhorn ably answered a large number of questions asked of him, relative to the vaccine and its use under various conditions.

The literary program closed with the reading of a splendid paper by Dr. E. I. Smith, of Nashville, Tenn., entitled "The Creation of New Veterinary Medical Associations, Their Duties and Obligations." In this paper Dr. Smith predicted a wonderful future for the Dixie Veterinary Medical Association. He enumerated a number of things which veterinarians should constantly have in mind, with a view to increasing their efficiency, concluding with the advice to read the veterinary medical journals, study thoroughly each individual case, and always attend every meeting of the Dixie Veterinary Medical Association.

Thursday evening a sumptuous banquet was served, followed by an elaborate entertainment consisting of music, both vocal and instrumental, readings, and dancing. At a short business session, a constitution and by-laws was adopted and the following officers elected for the ensuing year: President, Dr. F. J. Douglas, New Orleans, La.; First Vice-President, Dr. Chas. H. Wright, Jackson, Tenn.; Second Vice-President, Dr. W. G. Warren, Gallatin, Tenn.; Secretary-Treasurer, Dr. C. C. Brown, Memphis, Tenn.

NECROLOGY

WILLIAM F. KIRCHNER

Mr. William F. Kirchner, of New York City, father of Mrs. Robert W. Ellis, died October 8, 1923. Many of our older members, who attended the meeting in New Haven, in 1906, and a number of those immediately subsequent, will remember Mr. Kirchner, who derived much pleasure in attending our annual gatherings in company with Dr. and Mrs. Ellis.

Mr. Kirchner attended the Grand Army National Encampment, at Indianapolis, in 1921, and while there was the victim of an apoplectic strike, necessitating a three-months stay in the hospital. He improved right along, until the last week in August, when he was stricken with a light attack of la grippe, which left his heart quite weak. He never rallied completely and died suddenly at 7:40 p. m., October 8. He was in his 82nd year.

He was a member of the Military Order of the Loyal Legion (Officers of the Civil War), the Army of the Potomac and the G. A. R. since 1868. He took a very active part in the affairs of the G. A. R., having been chairman of the Memorial Committee when he was first stricken. In 1918 he was Department State Commander of New York. He served for thirty-eight years as a member of the police force in New York City, having retired with rank of Captain in 1901.

LLOYD K. MAGLEY

Dr. Lloyd K. Magley, of Decatur, Indiana, died September 4, 1923, following an attack of acute dilatation of the heart. He was born in Decatur, October 15, 1892. He married Miss Luella M. Conrad, March 1, 1916.

Dr. Magley was a graduate of the Indiana Veterinary College, class of 1915. He entered the Veterinary Reserve Corps and saw overseas service, reaching the rank of Captain. He joined the A. V. M. A. in 1918. He was also a member of the Indiana State Veterinary Medical Association and the Northeastern Indiana Veterinary Medical Association.

JOHN SEVENSTER

Dr. John Sevenster, of Hamburg, Iowa, died April 24, 1922. He was born in Dokum, Province of Friesland, Holland, October 24, 1868. He married Miss Jennie Hern, of Buffalo, N. Y., November 23, 1912, who survives him.

Dr. Sevenster received his early veterinary training at the Veterinary College in Utrecht, Holland, graduating in 1892. Two years later he came to America and practiced in New York State for a while. Later he attended the McKillip Veterinary College and graduated in 1905.

Entering the meat inspection service of the Bureau of Animal Industry, the same year, he was assigned to South St. Joseph, Mo., and later to Chicago and Omaha. He was for a time on tick eradication under Dr. J. A. Kiernan. He resigned in 1911 to enter private practice at Hamburg, Iowa. He was an Assistant State Veterinarian at the time of his death.

FRANK HUNT

Dr. Frank Hunt died at his residence, 409 Cherry Street, Jamestown, N. Y., on September 29, 1923, after an illness of several months. He was sixty years of age.

Graduating from the Ontario Veterinary College, in 1887, Dr. Hunt returned to his home town after graduation and practiced there for over thirty-five years. He served his city as a member of the Board of Health and for many years was City Inspector.

Dr. Hunt joined the A. V. M. A. in 1907. He was an Elk and also a Knight of the Maccabees. He was held in high esteem in his community and will be greatly missed by all those who had the privilege of knowing him.

F. F. R.

C. LINCOLN FURBUSH

Dr. C. Lincoln Furbush, of Philadelphia, Pa., died July 1, 1923. He performed meritorious military service in Cuba and the Canal Zone, and gave material assistance in the Surgeon General's Office during the World War in organizing the Veterinary Corps. Dr. Furbush was Director of Health and Charities of Philadelphia at the time of his death.

C. J. M.

IRWIN C. NEWHARD

Dr. Irwin C. Newhard, of Ashland, Pa., died suddenly, at his home, September 24, 1923. He was a graduate of the New York College of Veterinary Surgeons, class of 1893, and enjoyed a very extensive practice in Schuylkill County (Pa.) for many years. Much of his work was with mules used in the coal mines.

Dr. Newhard joined the American Veterinary Medical Association at the Philadelphia meeting in 1908. He took an active part in the Pennsylvania State Veterinary Medical Association and the Schuylkill Valley Veterinary Medical Association.

ROBERT E. COLLINS

Dr. Robert E. Collins, of Memphis, Tenn., died very suddenly August 5, 1923. Heart failure was the cause of death. He stopped at a garage, in Memphis, and while the attendant went inside to get something for Dr. Collins, the latter collapsed alongside his car. It was not known until after his death that he had been suffering from heart trouble.

Dr. Collins was a graduate of the Ontario Veterinary College, class of 1893. He enjoyed a very lucrative practice at the Union Stock Yards, in Memphis. He joined the A. V. M. A. in 1907.

MRS. CLARKE HEDLEY

Mrs. Clarke Hedley, wife of Dr. Clarke Hedley, of Conway, South Carolina, veterinary inspector of the B. A. I. Tick Eradication Division, died suddenly October 2, 1923, at the home of her sister, in Harrisburg, Pa., while on a vacation trip, having motored there from the South. Mrs. Hedley leaves her husband, a daughter, Mrs. Moyelia Sessions, and a sister to mourn her loss.

C. PRICE DIXON

Dr. C. Price Dixon, of Charlottesville, Va., died February 24, 1923. Pneumonia was the cause of death. Dr. Dixon was ill but a few days. He was a graduate of the Ohio Veterinary College, class of 1893. He joined the A. V. M. A., in 1907.

LEONARD G. W. HART, SR.

Dr. L. G. W. Hart, Sr., whose serious accident was chronicled in the October issue of the JOURNAL, died September 12th. He was a graduate of the Ontario Veterinary College, class of 1892, and practiced for many years at Chippewa Falls, Wis. He joined the A. V. M. A. in 1917. He was a member of the Wisconsin Veterinary Medical Association and always took a very prominent part in the affairs of that body.

FREDERICK E. COMMINS

Dr. Frederick E. Commins, of San Francisco, Calif., died June 21, 1923, after an extended illness. He was a graduate of the San Francisco Veterinary College, class of 1910. Dr. Commins was a veterinary inspector for the Board of Health of San Francisco. He joined the A. V. M. A. at the Oakland meeting, in 1915. He was in his 37th year at the time of his death.

IRVING D. SOUTHWORTH

Dr. Irving D. Southworth, of Gillette, Wyoming, passed away July 27, 1923, at Batavia, N. Y., his old home, after an illness of almost a year.

Dr. Southworth was a graduate of Ohio State University, class of 1911. Shortly after graduation he located in Avon, N. Y., and then removed to Blackfoot, Idaho. For a time he was Assistant State Veterinarian of Idaho. He was a member of the Alpha Psi Fraternity.

H. E. WARD

Dr. H. E. Ward, of Sanford, Maine, died suddenly during the latter part of September.

Our sympathy goes out to Dr. Baltazar Karganilla, District Veterinarian, Balanga, Bataan, Philippine Islands, who has suffered a double misfortune in the successive death of two of his children recently.

MARRIAGES

Dr. H. T. Larson and Miss Tecla Hedman, of Ashland, Wis., Aug. 29, 1923.

Dr. F. M. Monroe, of Dana, Ind., and Miss Myrtle Miller, June 21, 1923.

BIRTHS

Dr. and Mrs. E. T. Brockman, of Letcher, S. D., a daughter, Sept. 5, 1923.

Dr. and Mrs. H. C. Stephenson, of Ithaca, N. Y., a daughter, Oct. 7, 1923.

Dr. and Mrs. J. A. Latham, of Baldwin, Kan., a son, Albert, Aug. 28, 1923.

Dr. and Mrs. E. A. Miller, of Indianapolis, Ind., a daughter, Patricia Jane, Aug. 9, 1923.

Dr. and Mrs. John L. Bullock, of Oxford, N. C., a son, George Pleasant, July 26, 1923.

Dr. and Mrs. L. W. Stevens, of Wilsonville, Nebr., a son, Lee Frederick, Aug. 19, 1923.

Dr. and Mrs. F. W. Seekamp, of Greenfield, Ill., a son, Frederick William, Jr., Aug. 30, 1923.

Dr. and Mrs. Z. L. Williams, of Cleveland, Wis., a daughter, Elizabeth Lois, Aug. 14, 1923.

PERSONAL

Dr. Hubert C. Smith (Iowa '23) is located at Jesup, Iowa.

Dr. Curtis A. Fridirici (U. P. '21) has located at Fogelsville, Pa.

Lt. S. C. Dildine (Ohio '17) is stationed at Fort Sam Houston, Texas.

Dr. J. Chas. Wheat (Corn. '13) has removed from Moravia, N. Y. to Syracuse.

Dr. S. G. Bittick (Chi. '16) of Fort Worth, Texas, is City Milk and Dairy Inspector.

Dr. Willis B. Lincoln (Iowa '93) has been appointed State Veterinarian of Tennessee.

Dr. A. P. Sturrock (Corn. '17) of Waterford, Pa., was a recent visitor in Ithaca, N. Y.

Dr. Myron L. Plumer (U. P. '16), formerly at Branchville, N. J., is now at Newton, N. J.

Dr. G. C. Monroe has removed from Walnut Cove, North Carolina, to Mount Airy, same state.

Dr. F. A. Humphreys (Ont. '19) is now at Yorkton, Sask., having been transferred from Regina.

Dr. A. F. Schalk (Ohio '08) is on a short leave of absence from the North Dakota Agricultural College.

Dr. Joseph W. Vansant, Fox Chase, Pa., is enjoying his vacation hunting big game in the Maine woods.

Dr. Raymond J. Lynch has associated himself in practice with Dr. B. H. Tallman, at Williamsport, Pa.

Dr. Clyde C. Hunt, formerly of Washington, N. C., gives his new address as 51 Fifth Street, Lorain, Ohio.

Dr. J. H. Yarborough (Iowa '23) has removed from Lowryville, S. C., and located at Denmark, same state.

Dr. A. H. McClelland (Corn. '12), formerly of Buffalo, is now engaged in general practice at Walton, N. Y.

Dr. V. S. Larson (Chi. '10), of Berlin, Wisc. has succeeded Dr. O. H. Eliason as State Veterinarian of Wisconsin.

Dr. Chas. W. Humphrey (Geo. Wash. '11), is now stationed at Lancaster, Pa. His address is 732 N. Lime Street.

Dr. Joseph Patt, of Mobile, Alabama, has returned to his practice after an absence of four months spent in Colorado.

Dr. R. R. Birch (Corn. '12) and family have returned to Ithaca, N. Y., after an extended automobile trip through the West.

Dr. Harry M. Martin (U. P. '16), of the University of Nebraska, has been elected a member of Sigma Xi honorary fraternity.

Dr. F. W. Graves (Ind. '12), formerly of Hillsboro, Ind., has purchased the practice of Dr. J. A. Schwartz, at Wolcott, Ind.

Dr. R. O. Feeley (N. Y.-Amer. '06), of Clemson College, S. C., has returned to his work after having been absent on a sick leave.

Dr. Harry J. Little, of Williamsport, Pa., received the nomination for Sheriff on the Democratic ticket, at the last election.

Dr. Roscoe C. Davis (Corn. '15), of Clinton, N. Y., has accepted a position with the State forces engaged in accredited-herd work.

Dr. T. M. Bayler (Chi. '11), of the McLean County Farm Bureau, is now at Normal, Illinois, having removed from Bloomington.

Dr. H. D. Laird (Corn. '11), formerly at Woodville, N. Y., is now at Owego, where he is acting in the capacity of County Veterinarian.

Dr. J. R. Varley (Corn. '20), who spent a year in Hawaii, has just returned and accepted a position with the Dairyman's League of New York.

Dr. C. H. Beckman (Iowa '20) of Humboldt, Iowa, recently joined the benedicts and is reported to have gone to Missouri for his honeymoon.

Dr. Geo. J. Gruenewald (McK. '14) has been transferred from Charleston, W. Va., to Trenton, N. J., with headquarters at 403 Wilkinson Building.

Mrs. Theodosia Baker, wife of our eminent ovine specialist, Dr. E. T. Baker, of Moscow, Idaho, has been appointed a member of the Idaho State Board of Nurses' Examiners.

Dr. J. B. Reidy (Corn. '02), B. A. I. Inspector in charge, Tuberculosis Eradication, Augusta, Maine, has been appointed Captain in the Veterinary Officers' Reserve Corps.

Dr. A. M. Mills (Corn. '20) has resigned his position at Cornell University to take up work with the Borden Farm Products Company. He entered upon his new duties October first.

Dr. M. H. Mabey (Corn. '17) has given up his practice at Cuba, N. Y., to take the place vacated by Dr. A. M. Mills, in the Department of Surgery, at Cornell, under Dr. J. N. Frost.

Dr. H. J. Milks (Corn. '04), E. Sunderville (Corn. '08) and C. E. Hayden (Corn. '14) represented the N. Y. State Veterinary College at the State Fair, the second week in September.

Dr. E. T. Booth (U. P. '09) Demonstrator of Anatomy at the School of Veterinary Medicine, University of Pennsylvania, has been ill for several weeks but is now convalescent.

Dr. J. F. Shigley (Corn. '15), for a number of years located in St. Paul, Minn., has accepted the position of Assistant Professor of Veterinary Science at the Pennsylvania State College.

Dr. J. Allen Hardy, for several years connected with the Board of Health of Detroit, Mich., has accepted a position in Charleston, W. Va., in connection with meat and milk inspection in that city.

Dr. Robert H. Wilson (K. S. A. C. '09), of Rochester, Mich., is chairman of a committee appointed by the Board of Commerce to draw up a milk inspection ordinance for the city of Rochester.

Dr. Clifton D. Lowe (Ohio '10) has resigned as State Veterinarian of Tennessee, to accept a position as Extension Animal Husbandman in the Bureau of Animal Industry, at Washington, D. C.

Dr. V. A. Moore was a guest at the dinner given by Editor Barnum, of the Syracuse Post-Standard, during State Fair week, for the leading representatives of the agricultural and live stock interests of New York State.

Francisco Menendez Guillot, formerly official veterinary inspector for the northern district of Porto Rico, is now connected with the Veterinary Extension Division of the Department of Agriculture, with offices at San Juan.

Dr. Septimus Sisson (Ont. '91) attended the forty-first annual meeting of the National Veterinary Medical Association of Great Britain and Ireland, at York, England, during August, and was honored by election to honorary membership in the Association.

Dr. J. G. Catlett (U. S. C. V. S. '16), formerly Inspector-in-charge at the Southeastern Packing Company, Fort Lauderdale, Florida, has tendered his resignation and has entered private practice at Miami, Florida. Dr. Catlett has been appointed part-time Dairy Inspector in that city.

Dr. Miller F. Barnes (U. P. '11) who has been associated with the Pennsylvania Bureau of Animal Industry in the capacity of specialist in the investigation of abortion and other diseases of the genital organs of cattle, has been appointed in charge of the Division of Laboratories of the Pennsylvania Bureau of Animal Industry located at Philadelphia, to succeed Dr. Fred Boerner, Jr. Dr. Barnes will continue with work in the investigation of cattle diseases.

Dr. William Sheppard (M. R. C. V. S. '70) recently sold the old Sheppard mansion and estate at Neck Road and East Thirteenth Street, Sheepshead Bay, Brooklyn, N. Y. The mansion is over one hundred years old and is said to be in such good condition that it will be moved to other ground instead of being torn down. Dr. and Mrs. Sheppard will make their home in Florida. They have gained a great deal of pleasure from raising some very fine Pekingese spaniels. Dr. Sheppard will be seventy-five years old on the 16th of next March.

